# Market entry into a crowded application market – an empirical study of a mobile sport application

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ABSTRACT OF THE
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Service Design is a process that allows the creation of new services solving people problems and needs. Nowadays, Service Design is used to improve innovation and to add additional value to products. This thesis studies the application of Service Design tools during the design of a mobile application that targets outdoor sports.

The study examines the situation of a local sport equipment and clothes manufacturer. The manufacturer is trying to engage its consumers in outdoor activities. According to the analysis of the current market situation and to the analysis of competitors, the manufacturer has decided that the best way to engage customers is through a mobile application. Considering this context, an analysis of the motivations that encourage companies adopting a service approach has been conducted. A market research has been performed in order to determine the possibility of developing the application in a situation where other manufacturers have already presented their own mobile software solutions. Finally, the manufacturer plans to involve its consumers by using a gamification approach. As a result, particular focus has been set on gamification to understand whether it is the correct tool to engage people.

The goal has been reached by performing a literature review of the service topic and by applying a participatory design methodology. Athletes, people that enjoy sports and members of the firm aged between 20 and 40 have participated in different design activities, including surveys and focus groups. Using these tools this study contributes by identifying the key features mountain climbers needs. Moreover, this thesis contributes by identifying available opportunities for diversifying from existing solutions. The result is a validated service prototype that aims at engaging people. The concept will be used as a guideline for the final application.

Keywords: Service Design, Servitization, Gamification, Outdoor sports

# Preface

This thesis is the result of a work that took more than 6 months and that will hopefully continue at least for another year. During this project I have encountered several problems spending good and bad times over them. I have to thank every single person who has helped me during this thesis, without them this work will not be completed.
I would like to express my gratitude to *Motorialab s.r.l.*, in particular to Riccardo De Filippi for the help I received during the entire process and I would like to thank the sport manufacturer for giving me the possibility to produce this thesis. Unfortunately, I cannot mention this company, they have helped me providing really useful information and market insights. I would also like to thank all my collegues in *FBK* for their support, in particular Michele Filosi, Giuseppe Jurman and Rachele Villani.
A special thank goes to both University of Trento and Aalto University. University of Trento is the university where I have previously obtained my bachelor degree, while thanks to the master double degree opportunity offered by the European Institute of Innovation & Technology (EIT) I have spent one year in Aalto. I really want to thank this second university and the entire staff for the great experience I had. I have encountered a different culture and I have really appreciated the effort professors put in teaching students and involving them in this culture.
Since this thesis is my last work as a student enrolled in EIT digital, I want to thank all the EIT staff. I had the great opportunity of being part of this program and I am grateful for all the support I have received. You have done a great job, Thank you all. Last but not least, as I did for my bachelor thesis I would express my gratitude to my family and my friends. They have supported me in every challenge I have encountered during this thesis. Again, this thesis will never be completed without their support and help.

Trento, 22.06.2016

Luca Colleoni

# Contents

# Symbols and abbreviations

## Abbreviations

| | |
|---|---|
| **AHA** | Active and Health Ageing |
| **CRM** | Customer Relationship Management |
| **DS** | Design Science |
| **EIP** | European Innovation Partnership |
| **EIT** | European Institute of Innovation & Technology |
| **FBK** | Fondazione Bruno Kessler |
| **G-D logic** | Goods Dominant logic |
| **HCI** | Human Computer Interaction |
| **IBM** | International Business Machines |
| **IHIP** | Intangibility, Heterogeneity, Inseparability, Perishability |
| **IoT** | Internet of Things |
| **IS** | information systems |
| **IT** | Information Technology |
| **KIC** | Knowledge and Innovation Communities |
| **OIA** | Outdoor Industry Association |
| **RQ** | Research Question |
| **S-D logic** | Service Dominant logic |
| **WHO** | World Health Organization |

# 1 Introduction

## 1.1 Ageing population, outdoor sports, services and customer engagement

Global health related trends and issues (such as ageing population) are affecting our society. In recent years, health related challenges have emerged, and actions have been taken in order to prevent them; this trend has been confirmed by the increasing importance acquired by the wellness industry. In few years, the wellness industry became one of the fastest-growing and world's largest industries and reached a market value which is threefold the market of the global pharmaceutical industry [Institute, 2014].
Although people tend to consider health as a personal aspect, population health impacts also on public finance. The entire world is facing the problem of ageing population and several countries have already reported an increased average life expectancy and a low rate of new births. Two analyses performed by the *Standard & Poor's* agency in 2010 [Poor's, 2010] and in 2013 [Poor's, 2013] reports that the over 65 population is expected to double before 2050 and the cost of taking care of those persons would profoundly affect and increase public costs. Different strategies have been adopted in order to mitigate and prevent health related problems together with costs. For example, the Active and Health Ageing (AHA) project by the European Innovation Partnership (EIP) is trying to increase the average healthy lifespan by 2020, pursuing a target increment of two additional years [Lagiewka, 2012]. Meanwhile, others institutions are trying to sensitize the population by providing useful information and guidelines about healthy foods and healthy activities.

Outdoor sports and in general activities have been demonstrated to influence people health [Wankel and Berger, 1990]. In particular, younger benefits from active outdoor lifestyles [McCurdy et al., 2016]: for instance, spending time outdoor has been proven helping in reducing the prevalence of myopia in children [Rose et al., 2007]. Moreover, the World Health Organization (WHO) has recognized physical activity and body weight control as key activities to prevent the two most important causes of death in Europe, which are cardiovascular diseases and cancer [health organization, 2016].
Furthermore, outdoor activities target also other social problems. Sport practitioners are exposed to beautiful environments and panoramas, thus they will understand the necessity of preserving the natural environment [Outdoor Industry association, 2012]. Also municipalities and local authorities are really interested in engaging people in outdoor sports, since investments could increase their local economy promoting sport centres and encouraging tourists to visit their territory.
Considering these possibilities and the huge availability of smartphones and technological instruments, several companies have started producing software solutions to motivate people spending time outdoor.

Similarly to other sectors, key enablers of new solutions that target health and

wellbeing are services and IT innovations.
Digitalization and in general IT-related services improvements such as new technologies have changed the way we develop and perceive services [Pajarinen et al., 2013]. Today we find difficulties in identify services up to the point that we question about the validity of the traditional views of services, which classify services based on what they are not [Vargo and Lusch, 2004b]. Digitalization is the major driver of the current service revolution. The large availability of personal computers and the continuous development of the digital infrastructure facilitate the access to the Internet for a continuously increasing user base, setting the prerequisites for service digitalization [Williams et al., 2008]. According to [Williams et al., 2008], a digital service is a benefit that is exchanged between different users using a digital transaction. Thus, a digital services implies the involvement of at least two entities, the one that provides the service is the service provider while the one that obtains the service is the user. New technologies permit also to directly produce and exchange services without any personal contact with the provider [Taherdoost et al., 2013].
Digitalized services enable an economy of scale, since they can be produced, stored multiplied and consumed at every time in every place without any restriction [Pajarinen et al., 2013]. Companies can benefit from digitalized services to deliver products and in general to mechanize customer relationships [Taherdoost et al., 2013]: both actions directly influence cost reduction. Moreover, digital services provide companies with new opportunities to attract customers. Nowadays, even companies that were traditionally producing physical artefacts are moving to the world of digital services. In this context, services are typically adopted initially to support physical products. For example, services could offer maintenance planning, fault prevention or extended functionalities such as remote management through mobile applications. Sometime later, companies may realize that services are more important than their products itself and thus completely move on to service development. The recent shift to the world of services implies the setup of new processes and new researches for the design of this new typology of services [Williams et al., 2008].

Service Design is the young and emerging discipline that tries to study this new phenomena. It is a fact that Service Design is so young that it still misses a standard definition, as pointed out in [Stickdorn and Schneider, 2012] where the authors have described Service Design as an iterative approach involving several different disciplines and composed of four phases: exploration, creation, reflection and implementation. Before any Service Design operation can take place, a really important step in Service Design is to understand which kind of customer will adopt the new service. Furthermore, investigation should identify key features the service needs to attract customer attention. Once the customer has been correctly identified, it is important to understand whether the service could retain customer attention in time and evaluate possible improvement to reach this goal. It is important to understand that the value of a service usually depends on how many users use it and how often. In recent years, developers and designers have started introducing typical gaming aspects in services in order to increase engagement.

Customer engagement is a strong market requirement: the social network and application era is strongly based on the number of users adopting a specific solution. Being a market segment, outdoors activities are characterized by the same requirement of a good customer base. Users like to compare their performances or share places they visited and for these tasks they need other users.
Geographical outdoor game approaches have been promoted by successful applications such as *Forsquare* and *Ingres*. The first application motivates people to check-in in different places rewarding them with points, while the second one is an augmented reality game that motivates people in reaching specific places to help their team conquers the world.
Nowadays, several companies are trying to emulate the success of geographical-based activities in the outdoor sport segment. However, differently than previously described applications, at the moment they are not considering the game approach as a necessarily additional value.
This market segment is characterized by the presence of multiple stakeholders including different typologies of sport equipment manufacturers, tourism promoters, local administrators and sport centre managers.

Talented entrepreneurs have identified good opportunities in the development of services for health and wellbeing. In last five years, the market showed a strong interest in personal body sensors and software that perform data analysis. Companies such as *FitBit* have been created because of this trend, while others such as *Suunto*, *Sony*, *Samsung*, *Garmin*, *Polar* and *Nike* have increased their businesses. Body sensors help people daily monitoring their body, which is an interesting information assuming that adopters practice physical activities. Hardware companies such as *Intel*, *Raspberry*, *Harduino* and *Pebble* are investing lots of money and effort in producing new sensors.

*Nike Inc˙* is one of the historical brands that have invested in services. Back in 2006, *Nike* released the *Nike+IPod* sports kit, which was composed by an activity tracker placed in shoes and an application for *Apple*'s Ipod touch. Then in 2010, *Nike* released the Nike+ mobile application. Other market competitors have recently demonstrated similar interest in services. *The North Face* has developed a mobile application called Mountain Athletics, which helps people to train and prepare for mountain sports such as skiing.
The *Adidas Group* instead has taken a different approach: after developing its own application called *train&run* and *miCoach multi-sport*, it has bought the famous company *Runtastic* in 2015. In particular, in recent years the *Adidas Group* appears to be really active in the world of service. *Youtube* (and in general the Internet) is full of videos about new service demos developed by *Adidas*. Famous examples are the *smart digital window* in Nuremberg (Germany) and *CyberFIT* the interactive fitting cabin. The group is also selling smart bracelets and different fitness trackers that monitor the user activity, providing statistics and suggestions about possible improvements.
In 2015, other famous sport brands followed a similar approach by acquiring other

companies. As a result, they contributed creating a competitive acquisition market and highlighting the importance and possibilities of services in outdoor sports. *Under Armour* acquired the companies that developed the two applications *MyFitnessPal* and *Endomondo*, while *Amer Sports* acquired *Sports Tracker*. Finally in 2016, *Rossignol* and *PIQ* created a partnership and released their multi-sport sensor for ski and a mobile application.
In general, most of the software solutions that target sports offer tools that allow users to track personal performance and to compare them with friends or other users.

## 1.2 Aim of the study

This study examines the entire design process of a mobile application that targets outdoor sports. Several applications are already available in the market, and some of them have already reached millions of users. The focus is on designing an innovative application that possibly targets and solves social or ethical issues.
The starting point is an idea proposed by a sport equipment manufacturer, and this study presents a critical analysis of the idea itselft. A scientific approach has been adopted in order to provide an examination of potentially better approaches and to analyse future developments.
The final goal of the study is to prototype and validate a solution that addresses specific needs for clearly identified customer segment. This will hopefully provide a diversification opportunity to the manufacturer and identify reasons motivating the development of the mobile application attracting the attention of potential additional investors.
Furthermore, this study investigates recent trends that shift the market form physical-artefacts based approaches to solutions characterized by a complex mixture of artefacts and services.

## 1.3 Research background

This thesis has been carried out in the context of a double degree master programme offered by EIT Digital in Service Design and Engineering.
EIT is a European body founded in 2008 to promote innovation and entrepreneurship and to overcome future challenges. EIT brings together higher educational institutes, research labs and companies in order to develop innovative solutions and services [EIT, 2016]. EIT is also trying to help and to economically support companies and a new generation of talented entrepreneurs that propose sustainable and innovative ideas [EIT, 2016].
In particular, EIT Digital is an EIT Knowledge and Innovation Communities (KIC) that pursuits the goal of spurring digital technology innovation and entrepreneurial talent. This KIC offers to students the opportunity of a master's double degree in digital technology related topics [EIT, 2016]. Two different universities certify master degrees for each student. During their two years, master's students are required to spend one year in an entry university and one year in an exit university; at the end of the programme both universities release their degree and EIT releases a European

certificate.

Aalto University is my entry university while the University of Trento is my exit University. The thesis project has been developed during an internship in the start-up *Motorialab s.r.l.*, which is a company developing technological solutions for outdoor sports with a strong focus on wellness and safety.
*Motorialab* is a young spin-off of Fondazione Bruno Kessler (FBK), one of the most important research institutes of the Autonomous Province of Trento. The company was founded in 2014 and it is currently trying to revolutionize the outdoor sports industry working in the Business-to-Business market. The company main competences are geo-referenced data collection, data management and data analysis. *Motorialab* aims at providing its clients with a platform where each sport brand can store and analyse data collected by their products. Moreover, *Motorialab* offers its customers the possibility of comparing their products by using either data collected by users or anonymous information collected by other sport firms. Final goal is to help sport brands to develop new products and enables companies to specialize in particular equipment being able to certificate that their products perform better than other products in particular situations. Naturally, comparisons could include only companies that decided to use the platform: participation is the most critical point the start-up is addressing.
Following this goal, *Motorialab* produces tailor made software solutions for its customers and stores all the recorded data in an anonymous aggregated format on its storage servers.

A team of five members able to manage the entire competences stack required for the development of software solutions is the core task of the start-up. Three of the employees have previously worked together on the topics of geo-data and data analysis for 5 years, thus representing a well-formed team, while other two members are recent acquisitions. In particular, the company has recently employed a local expert of user interfaces design. Other team members are respectively playing the roles of: project manager, iOS/Android developer, web developer/system administrator and backend/database developer.

A sport equipment manufacturer (client) has recently hired *Motorialab* for the development of a mobile application, which aims at engaging customers and increasing brand recognition in mountain sports. Competitors have already released their own mobile applications and the client is worried that they could attract its customers. Moreover, the client wants to develop a mobile application because in future plans smartphones will work as data hubs for its connected products. Following the recent Internet of Things (IoT) trend, the client plans to implement sensors in all its future equipments.

## 1.4 Research contribution

This thesis describes an industry-driven business case starting from its embryonic stage. Due to the characteristics of *Motorialab*'s business model and client requests, in particular computation performance, the presented business project requires a communication channel between servers located in *Motorialab* and servers owned by the client. As a member of the company, the author has been asked to design and implement the integration software and, considering an EIT background, the author has been also asked to actively participate in all the design phases of the final software solution, identifying useful service design tools and eventual criticalities.

The client initially proposed to create a mobile application suitable for tracking user activities and provide useful statistics in four different mountain sports: alpine trekking alpine speed, alpine mountaineering and ski mountaineering. Using this initial idea as fundamental basis, this thesis elaborates the repeated use of service design tools in different iterations. This work contributes demonstrating that client is apparently using a wrong approach: the analysis evidenced that concentrating on a single discipline the client could have better market possibilities.
The final design obtained in this thesis strongly differs from initial idea of the buyer. Client is strongly suggested to consider at least some advantages offered by some of the key features the new design identified and implement them in the final application.

## 1.5 Research problem and questions

In the academic world, service design is characterized by an initial exploration stage: before developing new services or improving existing ones, designers are responsible to understand the environment in which they are working and the real problems users bear. At this stage, identifying a real problem is the key task, all solutions requires the presence of real issues they would solve.
However, in business world, development of new products or services often starts from marketing decisions or brand building needs. In this case, it is possible to distinguish between two different situations:

- In really specific cases companies have such innovative products or solutions that includes such killer features that they can afford to build problems around their assets.
- In other cases, companies could simply decide to develop new products starting from scratch following an initial raw-idea or hypothesis.

In the latter situation, which is the case of this work, service designers face a two-sided problem. On one hand, they have to accomplish with requirements and needs set by the company. On the other hand, they have to consider customer needs that were not considered when the decision of producing something new was taken. In fact, decisions are often market-centered and not user-centered.

Merging these two sides is not an easy task, because sometimes companies implicitly believe they know their customers while this is not always the case. Moreover, companies tend to identify customer needs by analysing available solutions provided by competitors. Unfortunately, this approach often leads to the development of similar products with small modifications and a different brand, penalizing innovation.
Considering a situation where a business client wants to create a mobile application for outdoor sports in an already crowded application market, this thesis addressed the following Research Question (RQ):

**RQ 1** Can a market decision be motivated using a posteriori user research in markets where most common needs are apparently already addressed?

**RQ 2** How to use Service Design methods and market research to uncover underserved needs in crowded markets?

**RQ 3** Does the complexity of an application design change when addressing engagement rather than only user needs? What are the possible strategies that allows to mix the two approaches?

First question investigates whether it is possible to shift a market-centered design to a user-centered one. Moreover, the investigation is performed in a difficult situation where several other players are already present in the target market and have already built strong brand recognition.
Second question is strictly related to the process of services design and it aims at identifying the best strategy designers could choose to benefit from available design tools. Customer needs are fundamental in service design process and in markets where other firms are already present, and new entries should look for underserved needs.
Finally, third question analyses the possibilities designers could adopt in order to engage consumers. The client requested the adoption of a gamification approach, thus, as a result, this question has been introduced in order to investigate its feasibility, its benefits and suitable alternatives.

## 1.6 Structure

This thesis is structured in six chapters.

**Chapter 1** Introduction

**Chapter 2** Literature Review
Presents an overall review of the available literature surrounding the topics of servitization, Service Design, customer engagement, gamification and user segmentation.

**Chapter 3** Research Method and activities

Describes tools and methodologies applied in this empirical study. This chapter describes also the process that shifted the final solution from a multisport-targeting application to a solution for a really specific customer segment.

**Chapter 4** Research Findings

Describes the obtained results presenting a final validated prototype.

**Chapter 5** Discussion

Provides answers to the research questions.

**Chapter 6** Conclusions

Presents overall results and final considerations about the entire study. Moreover, this chapter includes suggestions for further developments.

# 2 Literature Review

In this chapter it is conducted a literature review: academic papers have been analysed in order to outline the current state of the art of services and IT in outdoor sports. In particular, the attention has been focused on those reasons that encourage manufacturers and companies in general to invest money with the aim of producing new services rather than continuing with their artefact-based approach. This chapter has been introduced in order to explain why companies are led to take action to develop new services and why this strategy constitute an advantage for them. Moreover, in this chapter academic point of view is provided on new trends, including IoT, customer engagement and gamification.

## 2.1 World of services vs world of products

While products can be easily recognized, the characteristics of services and their definition have changed over time.

Lovelock and Wright [2001] provided two definitions of services, which can be re-elaborated as follows:

- A service is a performance or an act offered by an entity to another. The service can be strictly linked to or being itself part of a product. However, services are intangible and the results do not commonly include ownership of any of the production factors that took part into the service process.

- A service is an economic activity executed at a specific time and place that produce a desired change for a customer. The characteristic of this activity is that it creates value or provides benefits for the customers that required it.

In few words, services have been generally described as "anything you can exchange with others, which you cannot drop on your foot".
In general, discussion about services arose in the 1950s [Vargo and Lusch, 2004b] and since then services have been historically described referring to Intangibility, Heterogeneity, Inseparability, Perishability (IHIP). These characteristics are sometimes also defined as IHIP-framework. A first acceptance of these characteristics was reached already in the 1980s.
By summarizing these characteristics from [Zeithaml et al., 1985] and [Vargo and Lusch, 2004b] the following definitions can be obtained:

**Intangible** As they are activities services lack the palpable and tactile characteristics of goods, they can be neither touched nor eared or tasted. In general they cannot be perceived using the senses.

**Heterogeneous** Services are characterized by high variability in their performance and results. The same service performed by a different person or for a different customer could have a different result and even a different process.

**Perishable** Services cannot be stored, it is not possible to inventory a service. For example, a seat in an airplane that is not purchased is lost, it is not possible to store it for the next trip. Another simple example is a haircut, which cannot be stored.

**Inseparability of production and consumption** Production and consumption of services must occur at the same time. A person that wants a new haircut receive it at the same moment the hairdresser starts preparing it.
This characteristic is strictly linked with perishability, as it is due to the fact that a service cannot be stored. Inseparability demands for highly interaction between producers and customers.

In the last few years, several discussions have focused on IHIP-framework, especially by researchers who wish to understand if these characteristics are still valid. Several authors reported their criticism about these definitions claiming that IHIP is insufficient to differentiate goods and services. Other scholars, such as Vargo and Lusch [2004b] have also argued that at the moment there is no point in differentiating services and goods at all. In their opinion, goods and services complement each other and users are interested in obtaining results out of them rather than in their difference. Taking into consideration criticism about IHIP characteristics, nowadays, researchers have developed new frameworks that demonstrate, using theoretical analysis, how this characteristics are still valid. In particular, Moeller [2010] suggested that IHIP is still valid when considering certain aspects of services and not entire services.
The reasons why IHIP does not work when considering an entire service can be reduced to two factors. Firstly, service marketing has changed during time. Secondly, technological improvements have slowly blurred down the difference between services and goods [Moeller, 2010].
Focusing on this second factor, Huang and Rust [2013] defined it as the IT-service transformation, while Pajarinen et al. [2013] used the term digitalization. However, they have described exactly the same phenomena.
IT has contributed to the development of hybrid solutions of products and services up to the point that today authors such as Pajarinen et al. [2013] question also the validity of the division in three sectors of the world economy.

## 2.2 Goods-dominant vs Service-dominant logic

Considering the two worlds of goods and services described above and the blurred distinction between them, there are still two different approaches: Goods Dominant logic (G-D logic) and Service Dominant logic (S-D logic).
The basis of S-D logic dates back to the late 1970s, when a small group of marketing scholars begun to recognize the necessity of new studies in order to better understand services [Vargo and Lusch, 2004a]. The classical marketing fundamentals were based on the exchange of goods, such as commodities and manufactured products [Vargo and Lusch, 2004a]. They were thus not aligned to the new world of services [Huotari and Hamari, 2012]. The research initially followed an independent path that was not considered in the mainstream marketing science before the latest 1990s. The term

S-D logic was created only in 2004 and, as opposite to it, also the term G-D logic was adopted to indicate the classical marketing approach.

According to Vargo and Lusch [2004a]:

**G-D logic** Focuses on tangible goods and transactions.

**S-D logic** Focuses on intangible resources, interactions and co-creation.

Since 2004, this topic has raised an increasing interest. However, at the moment, G-D logic is still the predominant approach [Secomandi and Snelders, 2011].
Huotari and Hamari [2012] identified the two principal aspects of S-D logic in value-in-use and customers as co-producers.
In a typical G-D logic, production is a task completely executed by manufacturers, value is entirely created during the production process and it is finally embedded into the product. Afterwards, the value is entirely transferred to the customer at the purchasing time. This logic does not apply to services, because the absence of a physical product make the embedding of the value impossible and value can thus be perceived only using services.
As far as the co-production aspect is concerned, Huotari and Hamari [2012] reported that service marketing literature always recognizes customers as co-producers. As value is generated only during service consumption, companies cannot act as single producers, but they also have the responsibility to support their customers during the use of their products.
Similarly to the two worlds of services and products the two logics have nowadays been mixed together by creating hybrids solutions [Vargo and Lusch, 2004a] where goods and services integrate each other, in such a strong way that they are comparable without any evident predominance.
As for IHIP characteristics, customers are not interested in distinguishing between goods and services or in identifying the predominant factor, but they are interested in what they can obtain from solutions with the least effort and the best support. This new perspective has created the opportunity to move from one approach to the other one taking advantage of the characteristics of both.
According to [Leoni, 2015], nowadays the two phenomena of *Productization* and *Servitization* can be observed.

*Productization* is the process implemented by service companies to move from the world of services to the world of products. This approach mainly addresses the intangible characteristic of services.
In fact, this process improves the palpable characteristics of services and it often helps obtaining brand recognition, because it is easier for people to recognize products rather than services.
A famous brand that is currently employing a productization approach is *Amazon*. When *Jezz Bezos* founded Amazon in 2004, the firm initially started as an on-line bookstore. Then, after a few years, it started to sell several different items for third party partners. Today, *Amazon* is also producing goods with the *Amazon Basic*

brand. Moreover, rumours claim that *Amazon* is planning to open physical shops.

*Servitization* refers to the opposite process, regarding manufacturers and, in general, good producers that are moving to the world of services and trying to add additional value to their products [Salonen, 2011].
In this case, *Dell* represents a famous example of a company that adopted the correct approach. *Dell* is a pc and laptop manufacturer that has become famous for the level of personalization of the offers on its products. This level of personalization has been reached trough its online store and thanks to the different typologies of post selling services that it offers, such as maintenance and support.

## 2.3 Servitization

*Servitization* is a term that was originally coined by Vandermerwe and Rada [1989] to indicate the process of adding value to artefacts by coupling them with additional services.
Companies started adopting this approach in order to maintain competitiveness against emerging countries and low cost manufacturing, to overcome declining profitability in core products market [Salonen, 2011] and to extend product durability with support and maintenance in contexts where product innovation is excessively fast and is no longer sufficient to attract customers [Antioco et al., 2008].

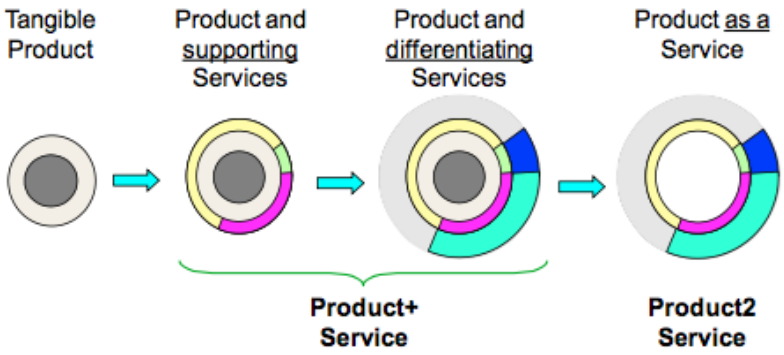


Figure 1: Servitization process [Chen and Cusmeroli, 2015]

Companies moved from selling products to selling complex systems that were built around products and included services. This strategy has often been adopted to such an extent, that at the end real products were the services themselves (Figure 1). The initial idea was based on the fact that a complex system of products and services constitute an additional value when compared to the single products [Roy et al., 2009]. In this way, companies believed that they could maintain they leadership: while their low-cost competitors were focused on lowering prices, higher prices were motivated by the higher level of the delivered solutions.

In 2009, Roy et al. [2009] published a literature review about *servitization*. According to this review, interest about this topic was already raised in late 1980s involving researchers and companies. Roy et al. [2009] reported that in 2009 there were already 60 papers about this topic while other 90 could be considered linked to it.
Nowadays, the process of servitization is still on going. The example reported in this thesis proves this statement, as it is described a company which is moving from the production of sport equipment to an IoT based approach where future "smart" sport equipment will be linked to mobile application that works as a data hub. Moreover, also the recent acquisition (2015) of the sport mobile tracking application named *Runtastic*, by the *Addidas Group* confirms this trend.
Services became so important that through *servitization* some companies moved to completely new businesses [Wise and Baumgartner, 1999] or increasingly concentrated on services rather than on products [Oliva and Kallenberg, 2003].
A frequently reported example that supports this thesis is the International Business Machines (IBM) case, which was reported by Pajarinen et al. [2013]. IBM one of the leading computer manufacturers both at consumer and at business level gradually shifted its main business to services. The company increasingly believed in software and services up to the point that in 2012 it completely sold its personal computer division to Lenovo. Afterwards, in 2014 IBM sold also the server division to the same buyer. At the moment, IBM only owns really specialised hardware divisions, such as the mainframe dedicated one. One of the biggest and newest services they provide is the possibility to use *Watson* the Artificial Intelligence they built. This technology allowed IBM to increase its popularity in the service sector as in 2011 *Watson* won the Jeopardy quiz show.

## 2.4 Service Design

Service Design is the discipline that tries to study the new service phenomena.
Defining Service Design is itself a real challenge and in fact a single accepted definition is still missing: "If you would ask ten people what service design is, you would end up with eleven different answers" according to Stickdorn and Schneider [2012].
Stickdorn and Schneider [2012] claimed that Service Design is an evolving approach that incorporates several disciplines, including their methods and tools. For example, roots have been identified in interaction design [Sangiorgi, 2009], communication design and information design [Sanders and Stappers, 2008].
One of the reasons that makes this definition so difficult is that Service Design is still an emerging discipline, as it was first paid attention to this topic during the design conference *Emergence* at Carnegie Mellon University's School of Design in 2006 [Sanders and Stappers, 2008].
Stickdorn and Schneider [2012] reported that due to the interdisciplinary and evolving approach of Service Design, finding a definition could even produce the side-effect of limit Service Design evolution. They defined this particular characteristic of a missing definition as one of the great strength of Service Design.

One of the most important research on Service Design has been conducted by Stickdorn and Schneider [2012], who recognized the necessity for a textbook targeting courses and study programs. In particular, they collected several different definitions of services design.

The most general description of Service Design provided by Fonteijn [2008]

"When you have 2 coffee shops right next to each other, that each sell the exact same coffee at the exact same price; Service Design is what make you walk into the one and not the other, come back often and tell your friends about it."

Frontier service design [2010] highlights the fact that Service Design analyses customer needs.

"Service Design is a holistic way for a business to gain a comprehensive, empathic understanding of customer need"

Instead, The Copenhagen Institute of Interaction Design [2008] underlines the innovative aspects of Service Design and the fact that it provides improvements.

"Service Design helps to innovate (create new) or improve (existing) services to make them more useful, usable, desirable for clients and efficient as well as effective for organisations."

live|work studio [2010] continues by adding the creative aspect.

"Service Design is the application of established design process and skills to the development of services. It is a creative and practical way to improve existing services and innovate new ones."

Trying to summarize the different definitions, we can define Service Design as a holistic creative process that aims to improve or innovate existing services using established design processes and focusing on customers needs. This process results in services that are more useful and desirable for clients, which consequently represent a competitive advantage.

### 2.4.1 Actors and definitions in Service Design

Due to a lack of a standard definition, Stickdorn and Schneider [2012] identified the need for a description of the common roles in Service Design.

**User** is anyone that interacts with a service or a product. Some framework defines users as the persons that effectively use the service, thus consumers. On the other hand other scholars define everyone that is exposed to the service as user, including the employees of the service provider.


Figure 2: Common roles in Service Design [Stickdorn and Schneider, 2012]

**Stakeholder** is anyone that is interested in the development of the services and that contributes to the design process, providing their expertise and competence. They can help defining user requirements, suggesting and developing technical solutions or helping in defining the visual aspect of the product/service.

**Service provider** is an entity that owns, manages and offers a service to others in exchange of payment or of other services. However, nowadays services are also offered for free, and in these cases the service provider monetize on advertisement or by selling aggregated data on service usage. *Google* and *Android* probably represent the most known examples of this second approach.

**Service designer** is a person that alternatively focuses on the analysis of customers and the development of services that meet customer needs and technical requirements [Shimomura et al., 2007].


Figure 3: Recurrent terms in Service Design [Stickdorn and Schneider, 2012]

Moreover, other terms that often appears in Service Design literature are:

**Touchpoint** identifies a point of contact or interaction between a service provider and a customer [Clatworthy, 2011].
A service scenario is typically composed by several touch points . Touchpoints can be of different types: human-human, human-machine, machine-machine [Stickdorn and Schneider, 2012].

**Service evidence** is a tangible manifestation of a service, it can be identified in a visible result such as an artefact or just as a perception that something has happened behind the scenes.

**Service period** identifies the period of time in which the service is delivered. [Stickdorn and Schneider, 2012] decomposes it in three sub-periods: pre-service, service and post-service.

**Customer journey/Service blueprint** are maps of touch points that compose the service (Figure 4).
The customer journey represents a detailed visual map of the customer experience across touch points that users encounter during service consumption. On the other hand, service blueprint represents all the details concerning service delivering process across touch points, including back and front stage.

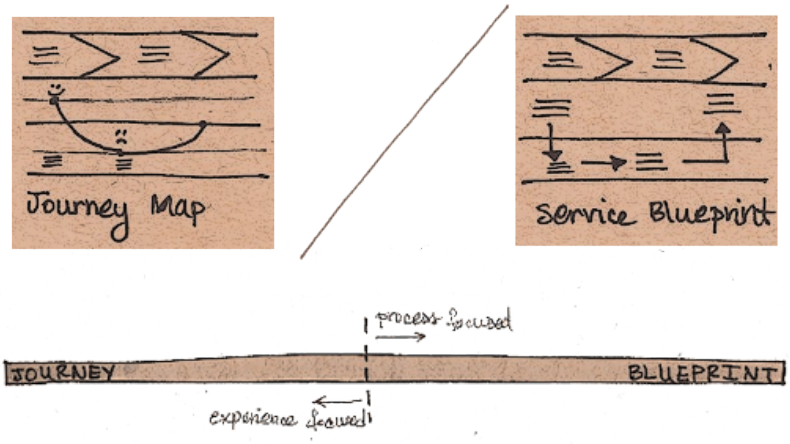


Figure 4: Customer journey vs Service blueprint [Samadzadeh, 2015]

### 2.4.2 Principles for Service Design

In their analysis Stickdorn and Schneider [2012] identified five principles of Service Design thinking.

**User-centered** Services are tailor made for users. Service value is produced during consumption and user participation is a crucial aspect. As a result, services designers must spend most of their effort to understand users and their habits in order to be sure to address the correct users needs.

**Co-creative** Once having established that Service Design is a user-centered discipline, it is necessary to consider the fact that a service can possibly have multiple consumers and participants. Different external stakeholders or products can take part in the process of service production and consumption, for example: front offices, vending machines, websites, managers, designers, engineers and more in general employees of the service providers. Service designers must involve and consider the necessity and requirements of all these external contributions.

**Sequencing** A service is the result of a dynamic combination of different actions and touch points that take place in a certain time period. The rhythm of these

interaction influences the way customers perceive the service. For example, in restaurants an excessively fast service could be perceived as low quality as it could mean that the food is not cooked properly and the restaurant wants the tables to be free as soon as possible. On the other hand, a really slow restaurant service could result in a boring situation and in the necessity of speeding up other operations in order to recover the wasted time for the meal. The timeline of all the involved actions and interactions needs to be deeply considered and analysed during Service Design.

**Evidencing** Service Design aims at making intangible services tangible and prolonging the service experience.
Most services are intangible, while others expire with time. Considering for example an haircut, after one month or even less it will be unnoticeable. However, if for example customers also buy a professional shampoo to take home, they will more likely remember that they went to the hairdresser. Physical objects that are owned and seen every day will in fact help the customer to remember a service experience.

**Holistic** Services are holistic. Services take place in a physical world and even though they are intangible they are characterized by physical aspects, for example touch points or physical outcomes. Thus, there are several ways of perceiving services. However, it is not possible to explain a service through its components. In fact, it is almost impossible to consider every single aspect of a service. Although service designers have to face this impossibility, they must be able to focus on a specific context to reach the desired result and to control the overall experience.

## 2.5 IT-Related services

According to Huang and Rust [2013], services are not new. Services have always been considered in the traditional three sectors division of the world economy. The new opportunity arises however from the union of services and Information Technology (IT). Huang and Rust [2013] claimed that IT is the real key for services transformation and they have identified four main roles for IT.

Firstly, IT acts as a facilitator simplifying and improving the communication between customer and service provider.

Secondly, IT acts as an enabler allowing customer and service providers to co-create value.

Thirdly, IT serves as the context. For example, the smartphone market is a clear context where mobile applications could be deployed.

Finally, IT can constitute the service itself. This is the case of the Internet and the social networks.

According to this classification, the application described in this thesis can be classified as facilitator and enabler. It is a facilitator as the company wants to employ it in order to build a strong brand recognition in the outdoor mountain sports. In the meantime it is an enabler, because the Application will work as a data hub, collecting useful information and sharing the obtained data with other users.

### 2.5.1 Internet of Things

IoT is the long-term vision that the client plans to follow in order to provide better IT-related services.
IoT indicates a network of internet connected physical objects that are able to measure data from the real world [Kopetz, 2011].
Each object is uniquely identifiable in the net and it is characterized by an embedded computing unit. This unit allows each object to interact with the environment and to exchange information with other objects. Objects that are part of the IoT can be also defined as "smart" objects [Kopetz, 2011], due to the their computational and interactive features.

Kevin Ashton originally coined the term IoT in 1999 [Ashton, 2009]. Originally, Ashton was trying to promote the idea of empowering computers to gather information autonomously. According to Ashton [2009], almost all data available on the Internet are inserted by humans and this represents a limit.
Humans are good in writing ideas, while the real world is based on things and computers are better at measuring things. Ashton [2009] suggested the use of supply chain technologies, such as sensors and Radio-frequency identification (RFID) technologies to empower computers to observe the world and share information without the limitation of data entered by humans.

Today, IoT is one of the most promising concepts. Key enablers of IoT are computational power, miniaturization and reduced costs of electronic devices. The novelty of IoT is not only represented by disruptive technologies, but newness is also represented by the large deployment of smart objects that characterize it [Kopetz, 2011].

Currently, easily understandable applications are in people homes, where modern objects can interact with each other in order to provide new services to the homeowners.
One of the companies with the highest product expectations is *Nest*, which is a start-up that produces a smart thermostat. The thermostat is able to control air temperature taking advantage of heuristics and learned behaviours. When coupled with a Wifi, the sensor is also able to communicate with the *Nest Cloud* [Hernandez et al., 2014]. Moreover, using the same Wifi the thermostat is able to understand when someone is in the building and to learn people habits.
Another IoT based product with high expectations and wide ranges of applicability

is *Echo* a voice based personal home assistant from *Amazon*.
Other companies use IoT to schedule maintenance and offer failure prevention. IoT has been also applied in the industrial sector, and Industrial Internet is the correct term to identify IoT in this context.

## 2.6 Customer engagement and IT opportunities

During the last decade, technology improvements have created a good environment for the proliferation of new channels of communication for consumers [Hennig-Thurau et al., 2010].
Online platforms such as *Twitter*, *Facebook*, *YouTube*, *Amazon*, communities and forums have influenced the way consumers can obtain and exchange information about products, activities or places they are interested in [Hennig-Thurau et al., 2010].
New media allow consumers to talk to each other and even to contact buyers, producers or advertisers without any effort, up to the point that these tasks have become natural [Deighton and Kornfeld, 2009]. According to Hennig-Thurau et al. [2010], real time information exchange is nowadays an integral part of natural consumers behaviour.

These new channels have a strong impact on the established business models to such an extent that markets strategies have moved from a broadcasting approach to an interactive one [Deighton and Kornfeld, 2009].
Analysing how these channels are composed, it is pretty clear that they consists of services. Thus, services act as channel enablers.
For example considering the electronic mail case, email is the channel, email providers are service providers and sending an email is a service. All these new improvements are strongly linked. There would be no channel without services.
Thanks to the new channels and services, customers are not simply consumers, they are part of communities of persons interested in certain products and also content producers. Platforms like *YouTube*, *Instagram* and *Twitter* do exist only thanks to the users that produce and insert new contents everyday.

Nowadays, consumers manifest a proactive approach and they are particularly visible [Deighton and Kornfeld, 2009]. They can contribute in the value chain by providing reviews, useful suggestions and directly interacting with producers. Moreover, active communities create interest around products and support their development and adoption. Products such as *Arduino* and *Raspberry PI* have really active communities. Compared to other products, their values is increased by the large amount of guidelines and support people can look for when using them.
Engagement is the correct term to describe this new proactive approach. Chapman [1997] defines engagement as something that attracts the user attention, and Van Doorn et al. [2010] adds that customer engagement is an approach that exceed the purchase action, as it involves a brand or a firm and it is a behavioural manifestation that results from motivational drivers.

Engagement is what companies are looking for in order to attract and preserve consumers, and this is what allows companies to survive in strong competitive markets. Engagement is not really new, it was present also without the new technologies and channels. However, now that the communication paradigm has shifted from only broadcasting to broadcasting and interaction, it has acquired major attention.

### 2.6.1 IT Engagement in outdoor sports

IT is increasingly present in the world of outdoors sports. At the present time, smartphones and smart watches include several different sensors with good accuracy levels. Companies such as *Garmin* and *Polar* have strongly improved their businesses creating GPS trackers, heartbeat monitors and smart watches.
Smartphones and mobile connections provide users with a handy always-available access to the Internet and enable them to retrieve more updated information and details about opportunities and places they are interested in. As a result, active outdoor firms could benefit from mobile device to deliver additional complementary services to their consumers while they are spending time outdoors [Bennet, 2014]. For example, mobile applications and online platforms allow users to create new contents or to add digital information to physical spaces and to share the result with others [Deighton and Kornfeld, 2009]. These characteristics make sensors and smart technologies suitable and sometimes essential instruments in outdoor sports.

The importance of technologies in outdoor sport is confirmed by the Outdoor Industry Association [2016], which reports that 73% of American outdoors consumers use their smartphones while practising outdoor activities.

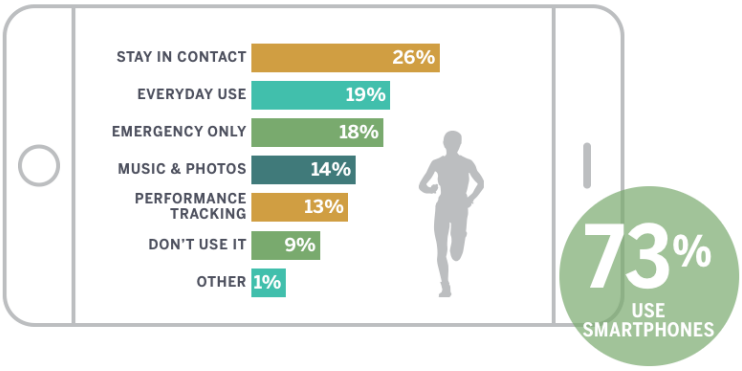


Figure 5: Smartphones adoption in outdoor sports [Outdoor Industry Association, 2016]

Moreover, the Outdoor Industry Association [2016] also performed an analysis of other technological instruments used by sport practitioners.

**Use of Technology by Outdoor Participants**

| | Ages 6–12 | Ages 13–17 | Ages 18–24 | Ages 25–44 | Ages 45+ |
|---|---|---|---|---|---|
| *iPod/Music Player* | 13% | 38% | 40% | 30% | 14% |
| *Smart phone* | 6% | 21% | 43% | 39% | 17% |
| *Handheld GPS* | 3% | 3% | 4% | 7% | 5% |
| *Laptop Computer* | 2% | 4% | 10% | 15% | 6% |
| *Tablet* | 2% | 2% | 5% | 9% | 3% |
| *Other Technology* | 2% | 1% | 2% | 2% | 4% |
| *Fitness Monitor* | 1% | 3% | 5% | 6% | 5% |
| *Watch-based GPS* | .2% | 1% | 3% | 4% | 2% |
| *None* | 79% | 48% | 31% | 35% | 64% |

Figure 6: Technology adoption in outdoors [Outdoor Foundation, 2013]

Outdoor Industry Association (OIA) reported that 75% of purchases are made using the Internet [Outdoor Industry Association, 2016]. Bennet [2014] identified this characteristic as a major disruption, in e-commerce companies could benefits from aging distribution models and challenges that directly competes with the network of specialized retailers. Online services are expected to cut the costs, but industries will need support during the challenging transition between the two models.

To sum up, outdoor industry represents a good environment for development of new IT-related services and, in addition, the industry is expected to shape a competitive environment in next few years [Bennet, 2014].

### 2.6.2 Gamification

Several companies have identified good opportunities in the outdoor sport market and in recent years they have influenced it with additional technology-related trends trying to increase their customer base.
In 15 years, the software market has been strongly inspired by the video games industry [Deterding et al., 2011]. As a result, nowadays lots of sport-based applications include game elements, such as points, leader-boards and badges (Figure 7).
In 2012, *Nick Pelling* coined the term "gamification" to indicate this approach [Marczewski, 2013]. Deterding et al. [2011] defines it as "the use of game design elements in non-game contexts". Park and Bae [2013] have integrated the definition considering also the adoption of typical thinking and mechanisms of games in non-game environments.

Gamification is a really controversial topic, strictly tied with service marketing [Huotari and Hamari, 2012]. Initially, it was considered as one of the most important future trends, while now researchers expressed some concerns on its effectiveness.
Transforming tasks into small challenges everyone could achieve has a psychological effect that helps people to perform actions without feeling the effort they are putting in them. Park and Bae [2013] support this phenomenon reporting the example of

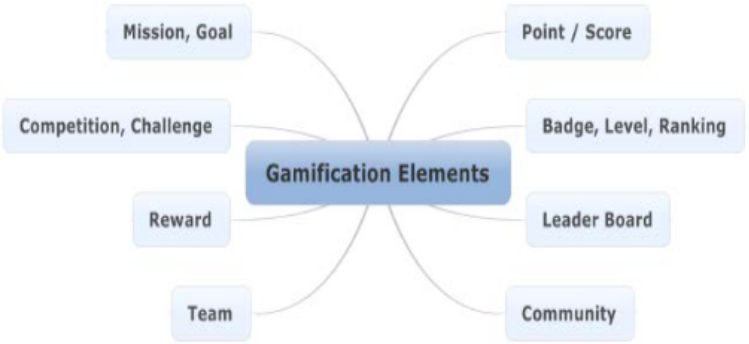


Figure 7: Example of gamification elements [Park and Bae, 2013]

the so-called *Fun Teory*, an experiment carried out by the *Volkswagen Groups* to encourage people to use the stairs. The stairs of the *Odenplan* subway in Stockholm were transformed in a giant piano for pedestrians and a camera has installed to detect people's position. Every time people ascended up or down the stairs a computer played the sound of the relative musical note. The car company reported that 66% more people used the stairs compared to usual traffic.
In 2011, Gartner [2011] estimated that by 2014 over 70% of global 2000 organizations were expected to release at least one gamified application. At that time, gamification was attracting people interests due to successful applications. Deterding et al. [2011] identified one of the first applications in the location-based service *Forsquare*, which, due to its geographical feature, represents a really interesting case for this case study.

Gamification detractors describe gamification as a difficult "evil" of marketing approach, which is based on a misinterpretation of typical game characteristics that usually does not produce the expected results. In recent years, gamification implementations have typically developed pursuing the goal of involving customers in marketing initiatives. Today, software companies sell gamification as an additional layer that includes rewards, badges, points, levels, discounts or just glory trough leader boards [Deterding et al., 2011]. After one year only, in 2012, Gartner [2012] released a second report claiming that 85% of gamified applications were expected to fail primarily because of poor design. Gartner [2012] identified difficulties in producing player-centric design, challenges and prizes that truly engage consumers.

## 2.7 User segmentation in outdoor activities

In order to offer the best consumer experience, companies have the responsibility to conduct research on users they want to target and to offer tailor made solutions.
The concept of market segmentation is based on the idea of visualizing a market as a heterogeneous group composed by homogeneous subgroups. Market segmentation assumes that people with similar interests have common purchase habits and respond in similar ways to marketing campaigns and programs [Wang, 2009].
User segmentation is based upon the necessity to find customers that are involved in

each market segment. On the other hand, market segmentation allows companies to efficiently and effectively contact and serve their consumers.

According to Wang [2009], the mass marketing approach is out-dated in today world, as it cannot satisfy all customer needs. Companies must provide different services and attractive personalized solutions in order to increase consumer satisfaction and manage customer retention.
Li and Shiu [2012] reported that the effectiveness of advertisements depends on how deeply the company knows its customers and the same is true for designing solutions. In the last 15 years, companies have implemented Customer Relationship Management (CRM) systems as the major business strategies to better understand their customers. With these systems they can now analyse the complete business process that involves the three stages of customer management: acquisition, cultivation and retention [Wang, 2009].

An important rule in marketing is the so-called "20–80" rule. According to this rule, companies that want to be profitable must find the 20% of core customers and maximise the focus on them because they will represent 80% of company future profit [Wang, 2009].
The OIA has identified 7 different user segments for outdoor consumers in the United States [Association, 2014]. These segments represent a good starting point for the development of any outdoor-based products or service.

**The achiever** represents enthusiast non-professional outdoor customers interested in competitions. Users in this segment participate in different sports and nothing can stop them from staying outdoors. They are interested in style and functionalities. Their brand loyalty is really low.

**The outdoor native** represents consumers less interested in competitions. They enjoy staying outdoors and they do it as often as they can and only exceptional events or appointments can stop them. They also enjoy involving their family in their activities. They look for durable products suitable for different activities. They start looking for products from traditional brands, however they do also enjoy mainstream firms. Technology is used for planning purposes, while they prefer to stay disconnected once they are outside.

**The urban athlete** represents people that do not necessarily enjoy spending time outside, but their favourite activities require them to. They have grown up practising sport and as a result they are competitive and social but not really interested in nature. They do not feel themselves as outdoorsy. Users in this category perceive time as a barrier that does not allow them to practice more. Finally, they prefer athletics brands and products with a particular interest in style.

**The aspirational core** represents people that enjoy adventures. They spend most of their time doing activities near home, even though they aspire to go further.

They are usually interested in few activities, one or two. They are ready to rent products to test new technologies or evaluate their interest in a specific activity and they like products specifically designed for their sports. This group differs from urban athletes for the way they enjoy sport, as they are more aspiration oriented than interested in participation. People in this segment are usually sensible to athletics and fashion brands. However, when they purchase a new item they still prefer traditional outdoor firms.

**The atheleisurist** represents people that are comfortable with their current outdoor level, they enjoy spending time outside even though they are not particularly active. In this segment, people are more interested in walking, relaxing and enjoing the environment, in general they are attracted by experience rather than performance. Atheleisurists are interested in durable products form mainstream historically present outdoor brands. This segment is characterized by the presence of old people that often live in rural areas, they are not really interested in technology and they consider staying outdoor as a way to disconnect even further.

**The sideliner** represents people who like spending time outside and enjoy fresh air, but they do not participate in intense activities. Walking, relaxing and barbecuing are their main interests. People in this category used to be more active, but now they are limited by physical limitations. Similarly to atheleisurists, they tend to be older and will most likely live in rural areas. Sideliners are interested in low cost products and brands that help them to overcome their physical problems, products they are interested in do not necessarily need to be technology related.

**The complacent** represents people limited in their ability to get outdoors by health and fitness. They did not grow up with an interest in outdoors and they prefer the comfort of indoors, for this reason they only perform low-intensity outdoor activities. Technology plays a really limited role for this customer segment, people are more interested in low-prices. Return of investment in this segment is really low.

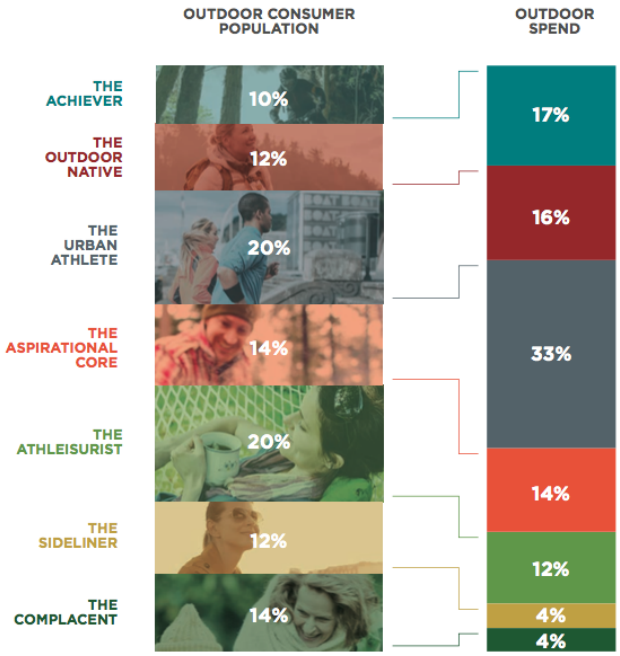


Figure 8: Outdoor consumer segmentation by OIA and percentage of spend they represents [Outdoor Industry Association, 2016]

Interesting, OIA identified an average spend of 456$ per person in the American Market.

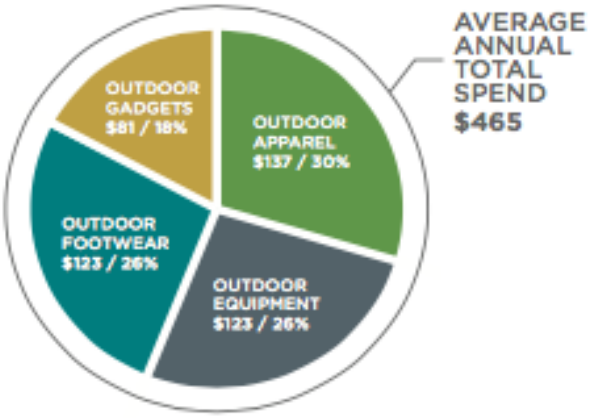


Figure 9: Consumer's Average annual spend by OIA [Outdoor Industry Association, 2016]

# 3 Research Method and activities

Due to its interdisciplinary approach, Service Design can be used and perceived both as an applied and as an explanatory science.
In order to benefit form both approaches and to overcome the problems that inhibit the adoption of explanatory science, this study adopts a Design Science Research methodology [Peffers et al., 2007]. The final goal of the study is not only to answer to the research questions using a theoretical approach, but also to collect real data that are useful to conduct the research and finally create a validated prototype. Using this prototype and the learnt lessons, this dissertation aims at answering to the initial research questions and at comparing the obtained results with the initial idea. According to Aken [2004], this strategy provides "field-tested and grounded technological rules". Aken [2004, pag.224] uses also the term research paradigm to indicate the collection of: research methodologies, research questions and the nature of the research products.
In contrast to sciences that try to grasp and describe reality, Design Science tries to produce solutions that target human related problems [Simon, 1996, pag. 55]. Design science has been adopted in information systems (IS) research to overcome the major inhibitions for adopting academic theory. Research in IS was previously based on theoretical descriptions and Aken [2004] identified this as a strong limitation and proposed a more practical approach in order to facilitate practitioners.
Aken [2004] identified two key concepts of Design Science: previously acquired knowledge and application of it. Design Science does not produce knowledge for uneducated people, but it produces knowledge for professionals.

## 3.1 Service design process

Different frameworks could be used to describe a service design process, but in this thesis the one eleborated by Stickdorn and Schneider [2012] has been adopted. This framework has been chosen thanks to its clear terminology and due to the fact that it offers a good level of abstraction.
In contrast to other methods, such as the Plan Do Check Act (PDCA) and the build-measure-learn, the framework developed by Stickdorn and Schneider [2012] is not based on chronological ordered phases, but it is instead based on activities. Activities can be performed following their natural order, getting back and forth from one activity to the others or even performing more than one at the same time, for this reason as Stickdorn and Schneider [2012] suggested the adopted process should be considered more as an iterative rough framework (Figure 10). The only requirement set by this framework is that moving from an action to the other should be motivated with a learned lesson.
This framework has been adopted in order to suit in the best way business processes, and to administer the fact that the development of new services must consider external influences, unplanned discoveries or new requirements could unexpectedly force changes on the established roadmap and force development to focus on different activities. Considering this characteristic, the following sections will introduce the

different phases that characterized the development of the application using an order that allows to link them one to each other, articulating a pseudo-real outline structure that guarantees a logical reasoning.


Figure 10: Service design process is an iterative process [Stickdorn and Schneider, 2012]

According to Stickdorn and Schneider [2012] a design process is composed of four different phases:

**Exploration** At this stage, the goal is to understand the environment to which service designers are going to contribute. Service designers should look for information about the company that wants to develop the new service, including their culture and their goals. Afterwards, the service designer should be able to identify a real problem understanding it from the perspective of customers, including both current and potential future ones. Finally, service designers should visualize the obtained findings and possibly prepare a rough structure of the previous services. This final step is necessary to improve communication with all stakeholders.

**Creation** This is the generative stage, in which service designers should use information previously acquired to suggest new solutions. At this stage, the service designer should already correctly understood the problem, the environment where the service is going to be implemented and all requirements set by stakeholders. In order to guarantee these requirements, stakeholders involvement and co-creation are two key features of this stage.

**Reflection** This stage is closely tied with the previous one as several short iterations could take place between these two stages. Short iterations allow to exploring different raw ideas, reducing their number and evaluating possible solutions. At this stage, it is necessary to test the produced service ideas and prototypes in circumstances and environments close to reality in order to obtain valid and reliable information.
Stickdorn and Schneider [2012] claimed that this stage is more about exploring mistakes rather than avoiding them. The result of this stage is a mature design and a complete prototype that has been already used to evaluate the proposed solution.

**Implementation** This stage does not consider the term implementation as the realization of the service, but it consider instead implementation as the installation of the service [Pichlis et al., 2014] analyzing all the changes it involves. Management of change could be a difficult task in big organizations, for this reason all stakeholders should be involved starting from the previous phases. The management should be really convinced of the new service and employees should be engaged, where applicable this approach results in a smooth transition [Stickdorn and Schneider, 2012].

When adopting this framework it is necessary to consider that this thesis has started already in the *Creation* phase. The client had already autonomously performed the initial *Exploration* stage and was ready to suggest a solution. As a result, *Exploration* activities have been initially skipped in terms of finding a problem, while they have been addressed in terms of understanding the needs of the client.
The previous chapters tried to describe the reasons that motivate the client choice of developing a mobile application, while this one starts directly form the point in which service design tools have been used in order to design and test a possible solution.

## 3.2 Service Design tools

Service designers could use several different tools during the design process, but only few of them were adopted in this thesis and these are described in the following sections.
For each tool it is provided a short analysis of the strength and the weakness points encountered while performing this particular service analysis.

| Tool | Strength | Weakness |
|---|---|---|
| Co-creation meetings | + Clear vision of the problem<br>+ Clear vision of the desired solution<br>+ Already provide a possible product | - Restricted number of participants<br>- Required time is significant<br>- Often participants are only managers and designers |
| Interviews | + Possibility to cover different topics<br>+ Many possibilities to improve between one interview and the others | - Difficulties in reaching a significant number of people<br>- Results are excessively personal<br>- Only useful to investigate problems on a general level |
| Focus groups | + Possibility to cover different topics<br>+ Easy way to analyse people feelings and reactions | - Difficulties in finding a common free time slot for all participants<br>- Only few possibilities to contact all persons, meetings could not fail |
| Market research | + Fast method to get significant results | - Available market analysis could be excessively general |
| Surveys | + Huge number of participants<br>+ Big amount of quantitative information | - Time required to prepare questions in a way that they do not influence questioned.<br>- Limited number of questions<br>- Difficulties in contacting really targeted groups of people |
| Customer Journey Map | + Visualize how a service is perceived | - It is almost impossible to find two identical journey maps<br>- Huge variability complicated the path towards a single visualization |

Table 1: Strength and weakness of employed Service Design Tools

### 3.2.1 Co-creation

Initial co-creation meetings have been organized with the client in order to understand the solution they wanted to develop. Unfortunately, only members of *Motorialab* and managers of the client company have been involved in these initial meetings. During co-creation sessions sketches have been largely adopted in order to better explain ideas and between each meeting, the user interface designer has developed mockups to explain his understanding and propose initial possibilities. Co-creation meetings has been performed for almost four months, but after the initial meetings I have focused on a more detailed problem and customer segment, for this reason the description here provided should be merely considered as a snapshot of the ideas *Motorialab* and the clients were working on.

The client aims at creating its personal outdoor sport application inspired to those already available, such as *Outdoor active* and *Strava*. The application would address the mountain sports of: alpine trekking, alpine speed, alpine mountaineering and ski

mountaineering, offering useful tracking tools, statistics about personal progress and social features. Compared to other solutions, the application will provide information about itineraries certified by testers and official alpine guides employed by the company, SOS functionalities and a section where the user could find information about the nearest shop or buy its equipment using the online store.

The typical information users need to have in outdoor sports have been identified in weather forecasts and typical usage of the application has been identified in performance tracking. The application collects customers data using smartphones embedded sensors and it examines them returning performance statistics, including average speed, distance, max altitude, time, elevation profile and map of the performed itinerary.
Moreover, the application will include a contests section. The client aims at engaging people providing prizes for particular achievements they establish from time to time. As a mountain equipment manufacturer, the client has decided to focus its challenges attention on the vertical difference accumulated by the users.

A first useful insight related to the environment where the application is going to be implemented has been provided by the client in an involuntarily comment. The client has reported that sometimes it is difficult to assign a prize to the person who won it, because people do not always accept to receive their prizes and this constitute a legal issue for companies. In fact, according to the Italian law in every contest someone should receive the prize. In order to accomplish regulations, sometimes companies are forced to send the prizes to charities, even though they would probably not need the particular item. For example it could be difficult for a charity association to use or recycle 400 helmet camera mounts.

To sum up, at this stage, the ideal application was addressing several different sports trying to involve as many customers as possible. I have identified major features and features that can be easily linked with consumers needs in: contest based engagement, tracking tools, SOS functionalities, weather information and certified itineraries, while other features such as store locator and social features appear to be additional convenient characteristics.
Figure 11 briefly summarizes all data and all stakeholders involved. The application represents the single touch point between the company and their consumers.

### 3.2.2 First Market Research

In parallel with co-creation meetings in *Motorialab* we also performed a market analysis of the currently available solutions in terms of mobile applications for outdoor mountain sports, including also sports that the client does not plan to address. We have included several different sports because we believe that it would not be difficult for a well established platform that targets most of the features we are looking for to compete with us implementing the missed characteristics and targeting the sports we are interested in. Thus, while analyzing current solutions we were also looking

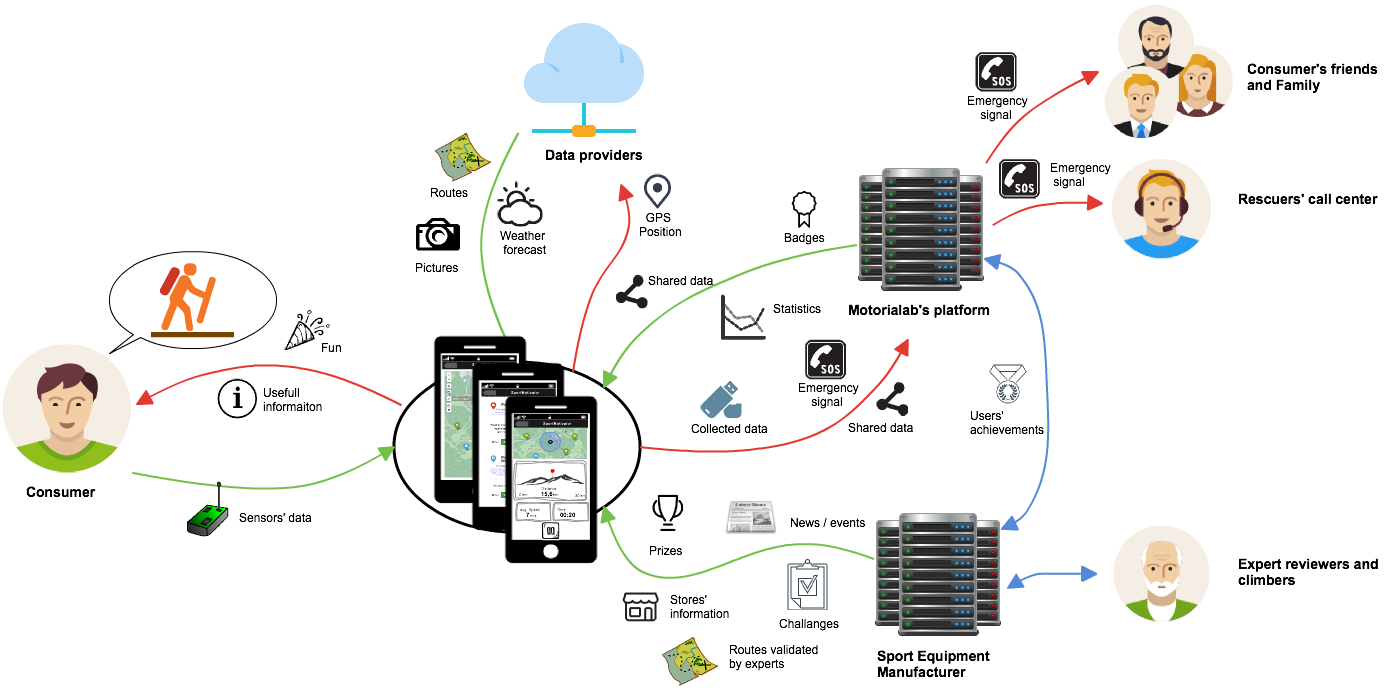


Figure 11: Application's features overview

for diversification opportunities for our final product.
The marketing research evidenced that several applications are already available and that they have already been downloaded by millions of users.
This analysis was performed aiming at two goals: the first one was looking for similar solutions and the second one was looking for interesting key features that were not discussed in co-creation meetings. The two general multi-sport targeting solutions most similar to the one identified by the client are the mobile applications *Outdoor active* and *Strava*, while in the mountain environment the most similar solution is *ViewRanger GPS*. One feature all these applications lack is weather information.

**Outdoor active** is an application mainly based on German language, contents are provided only in German and unfortunately bad-quality translations are available for the application. This solution provides itineraries for different sports, including climbing, hiking and skiing. It enables users to track personal itineraries and to look for itineraries for specific sports. The application also includes SOS functionality and some useful tools including altimeter and compass.

**Strava** is an application mainly based on cycling and running. In *Strava* users could track their route, analyse recorded data, visualize itineraries inserted by others, subscribe in small challenges without any recognition, find activities near their location, buy sport equipment and play training videos. Moreover, *Strava* includes a social mechanism similar to the one adopted by *Twitter*, so that users can follow the activities of their friends and can share their personal activities with their followers.

*Strava* also provides a web interface where users could better analyse their tracks and design the itinerary they want to perform next time.
*Strava* is a really big platform, it is possible to perceive its importance simply analysing how many other sport-based applications allow to export data to Strava accounts. The owners have recently introduced a gamification approach in which users can compare their performance on specific segments. Moreover, *Strava* allows everyone including companies to access different types of aggregated data collected form their users in order to infer new information such as the most busy cycling roads.

**View Ranger GPS** is a simple really efficient mobile application. It provides suggestions for different kinds of sports, providing both free and paid itineraries. The included search tool is really intuitive and the database appears rich and complete. Differently from *Strava*, in this application users could design their own itinerary directly form their smartphone, which due to the small screen of smartphones is a quite challenging action. *View Ranger GPS* includes the social mechanism of followers too.

Figure 12 reports a detailed overview of other 15 comparable solutions. In this case a really detailed approach has been used in order to highlight differences between the analysed applications.
As previously stated, the analysed mobile applications could address different sports.

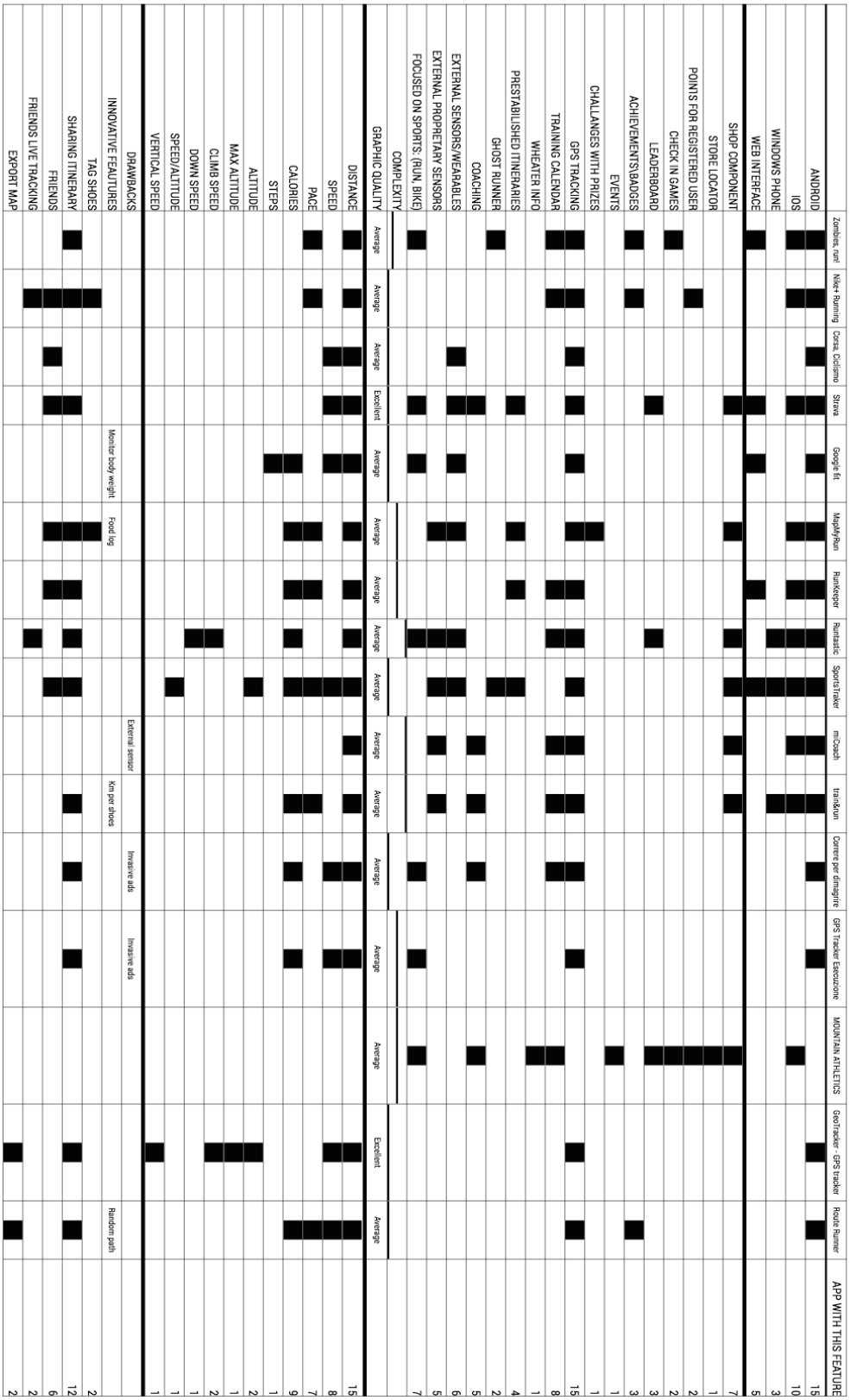


Figure 12: Existing applications and their features

In general, the application that the customer wants to develop does not significantly differs form the existing solutions. Other applications do not include all the features that the client is looking for but, however, they implement different additional tools and services.

In my opinion, several solutions that are already available enable the users to track sport activities, to share them with others and to look for reviews of itineraries. Obviously, they do not include all the features the client wants to develop. Nevertheless, they already represent a good starting point that could be improved implementing the lacking functionalities. Competitors would certainly being able of implementing the missed characteristics in a faster time compared to the time required for the development of a brand-new mobile application. Moreover, due to the large availability of applications, consumers will certainly identify the one that best suit their needs in the set of the already available ones. Finally and most importantly, these applications have already attracted a huge customer base, while a new application should provide something really interesting and vital in order to motivate people to renounce to all their recorded traces and to migrate to a new platform. I think that this is really difficult to achieve, in my opinion the customer should create a solution for a specific customer segment addressing needs that general targeting applications could not target.
Even famous companies adopted a similar approach: for instance, in 2004 when *Facebook* was first released, other social networks such as *Netlog* and *MySpace* were already in the market and they were used by million of users. The creator of *Facebook Mark Zuckerberg* launched it targeting universities and only afterwards the company became the giant public social network that we all know today.

### 3.2.3 Focus Groups

At *Motorialab* we organized two different focus groups without the presence of the client in order to avoid external influence that would potentially insist in developing the initial solution.
Five members composed each group and the decision of organizing small groups of people was mandatory due to the difficulties in finding a common time schedule to preform the meetings during the week. However, we turned this issue into an advantage. In fact, the first focus group was conducted using a general approach, as several different sports have been considered following the initial idea proposed by the client. Then, using the results obtained from the first meeting, we organized the second focus group focusing only on climbing.
Three men and two women composed the second group; three of them were experts while two were beginners. Using the results obtained in the second meeting I decided to investigate only this sport, while the customer and *Motorialab* worked on the initial solution. In particular, they were interested in usability tests performed on their mockups, while I was still interested in finding a real problem that could be solved thanks to the application.
In my opinion, the obtained results and the previous market analysis confirm that

focusing on a small user segment will provide a better business opportunity and the possibility to differentiate from the existing products. I had the feeling that the company was taking an excessively wide approach. I have identified the creation of a general solution similar to those already existing with small differences as a risky choice and I have thus preferred to concentrate on a single user segment providing a self-contained innovative solution.

The first focus group highlighted the following challenges and requirements in outdoor sports:

**Traffic** Some people prefer to practice sport in remote areas, as they want to completely enjoy the nature. In climbing, several people identify the presence of others as a potential safety risk. Some participants reported that they change their attitude because they are worried of the rocks that others could drop on their head or of the accidents that others can cause.

**Route status** Hikers and climbers need information about the current status of the routes. Hikers that encounter poorly maintained routes prefer to return back and the same happens for climbers that encounter really old bolts.

**Weather** A key information that everyone needs is weather. In sports where this is very critical such as climbing users tend to buy personal barometers, while others such as skiers consult several different providers in order to increase the probability of encountering the expected weather. We discovered that in some sports people tend to start collecting information even a week before their scheduled journey, for example skiers require information on the entire week in order to better predict the temperature and the quality of the snow.

**Information and route approach** Some information about specific places where people practice sports are available only in books, while in other cases online resources do not guarantee an acceptable level of information credibility. In addition, some of the interviewed people reported that sometimes it is difficult to find the specific point where the described itinerary starts.

**Vertical tracking** Expert climbers that practice long routes and traditional climbing often feel lost on cliffs. At the moment, there are no instruments that allow to vertically trace people and provide navigation instructions.

**Contests** Experts and professionals do not necessarily enjoy equipment-based prizes, they have really specific necessities and they perfectly know the equipment they still lack.

The second group confirmed that climbers are interested in:

**Weather** It has been confirmed as key information, people are interested in high-resolution affordable data and confirmed the importance of knowing the previous weather situation in the area where they climb. Someone reported that before going to a new place they prefer to spend some days in a hotel checking the weather and asking information to locals.

**Traffic** Some people are scared by the presence of others while others are not: it really depends from the place they climb, but in general they all agreed that they change their attitude in presence of others and anyway they would prefer to stay alone and not to wait for their turn.

**Route status** information about the status of routes is really welcomed, climbers need information on the kind of rocks, typologies of bolts and the year in which the route was created or in which last maintenance was performed. Moreover, crags orientation and solar exposition have been identified as interesting information, south-facing crags are typically characterized by a shorter drying time and thanks to their favourable solar exposition they can be safely climbed also during spring and late autumn.

**Contests** The people interviewed reported that sometimes beginners appreciate product-based prizes, and experts reported that anyway they could recycle the prize as gifts to friends. However, both agreed that a better prize would be a donation for route maintenance in their preferred areas. Even though climbing is a sport in which people prefer to practice alone or with few others, the sport is characterized by a strong collaboration and respect between athletes. Most of them desire the best for the sport rather than for themselves.

In general, the second focus group suggested that climbing is a sport where different improvements could be targeted.

### 3.2.4 Second Market Research

Once I focused on climbing, a second market research was needed. This research highlights a really interesting situation: few mobile applications are already targeting climbing but, however, none of them do represent a big player or has been released by a big firm. This aspect reveals an interesting situation for the client, as a company that enters in this market does neither address the problem of being the first innovator, which sometimes is challenging, nor the problem of encountering big competitions.

In particular, I have found six similar applications, Figure 13 compares their features with those I have identified as the key ones, which I included in an application named *Climber*.
The analysis highlights strong possibilities in the current application market. Reducing the number of features and the customer segments we are interested in, comparisons can be performed easily.
While performing the analysis of already available applications, I noticed that most of them provide paid reviews of the crags as their main feature. Very often, applications includes external links to books or to payment systems. At this point I started thinking about the hypothesis of a crowdsourcing system to collect crags information. Thanks to this approach users will not encounter boring payments and will have access to all information for free.

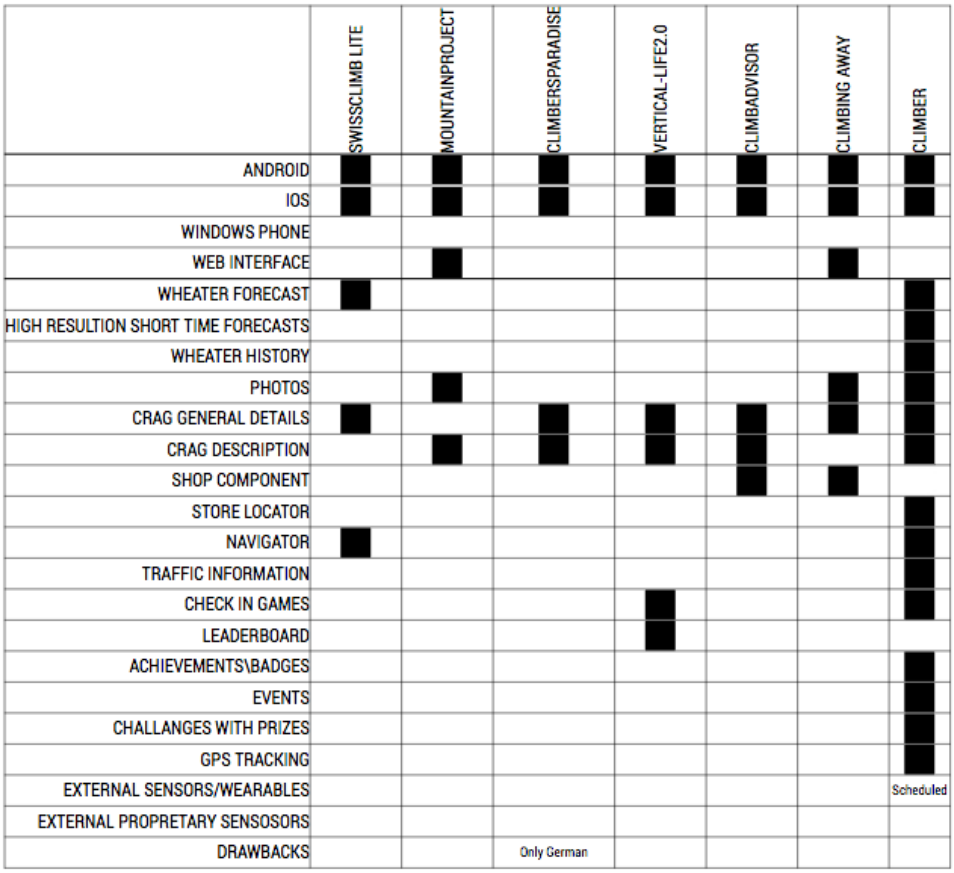


Figure 13: Existing applications in climbing

*TheCrag.com* is a crowdsourcing climbing community where climbers contribute inserting information about routes and crags, while several forums provide a similar service using a different format, for instance *PlanetMountain.com*. As a result, a similar approach could work and fortunately *TheCrags* was interested in creating a mobile application, but the community never released it.

In addition, a colleague of mine found a successful crowdfounding project [Whipper, 2016] for a beacon and the relative application that allows to track climbers. Before the deadline expiration, the project received more than twice the amount of required fundings. Using the results obtained in focus groups at that moment I was not interested in such a solution. However, this finding proves that also climbers are interested in mobile technologies and that they are ready to invest their money.

### 3.2.5 Survey

A survey approach was adopted in order to support previous findings with quantitative data. At that point only qualitative information was available, while quantitative data were limited due to the small number of participants in the previous service design steps. The survey aimed at confirming or removing already identified problems limiting the introduction of completely new ones.

The survey has been created with the goal of publishing it on the Internet in order to reach a great number of people, initially estimated in at least 120 individuals. Pursuing this goal, the maximum length of the survey was established in 15 questions with a maximum completion time of 4 minutes and this limitation is the reasons of the choice of avoiding the introduction of new problems.
The advantage that characterizes online surveys is that lots of people complete them for free, without the need for scheduling appointments and even without knowing the people who completed them. Once a survey is created, researchers should only wait for people to answers to it. However, the fact that people are doing it for free is also a limitation, because they could exit the survey at any time for any reasons, for instance they are not interested in the topic, they do not understand the questions, an error occurs or because the survey is excessively time consuming. Moreover, the number of participants really depends from the ability of the researchers to find the correct places to publish the survey. Sometimes, when targeting a really narrow customer segment, finding the correct places could be the nightmare of researchers. Another disadvantage of surveys is that there is no direct interaction between researchers and questioned, answers are provided without clear motivations and there are no possibilities of analysing participant reactions.

In this study case, the survey was published on few climbing forums using the Italian and the English languages, 50 persons answered the Italian version while 183 answered the English one.
Honestly, the survey also obtained some criticism by few participants, mainly regarding some unclear questions, a problem that is strictly linked to the amount of time required to create a good survey. A team can work for a month or even more to create a good survey, but in this study case time was precious, thus the applied strategy followed a “fail fast” approach.

Before analysing the obtained results it is necessary to make some considerations about the fact that the survey was published on online forums. In particular, this characteristic could influence the age of the participants shifting the average age in a younger range and it could also influence the approach people have with technology. Obviously, people that participate to online climbing-dedicated forums are familiar with technologies, and they could also use the same forum in order to access climbing suggestions and reviews.
Typical users that answer the research were men (Figure 15) aged between 24 and 35 (Figure 14) who defined their climbing level as average (Figure 16).
Initial hypotheses were that most climbers practice the sport indoor or that climbers are equally distributed among different places and among the different types of climbing. Instead, surprisingly a great majority of climbers prefer crags and climbing areas (Figure 17).

Moreover, the survey confuted our initial assumption about the possibility that publishing the survey in online forums we would influence the results concerning the preferred information source. The collected answers confirmed the information

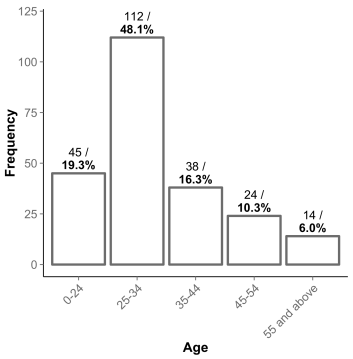


Figure 14: Climbers' age

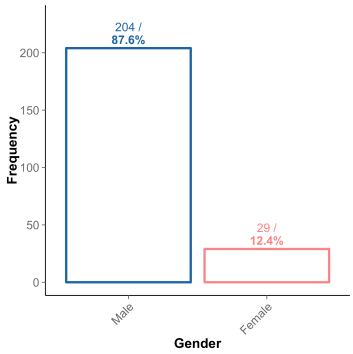


Figure 15: Climbers' gender

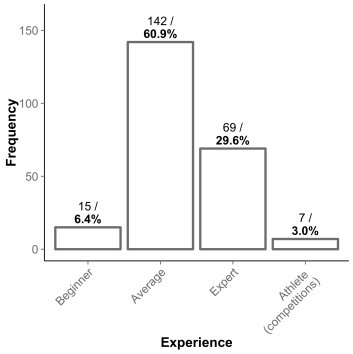


Figure 16: Climbers' level of experience

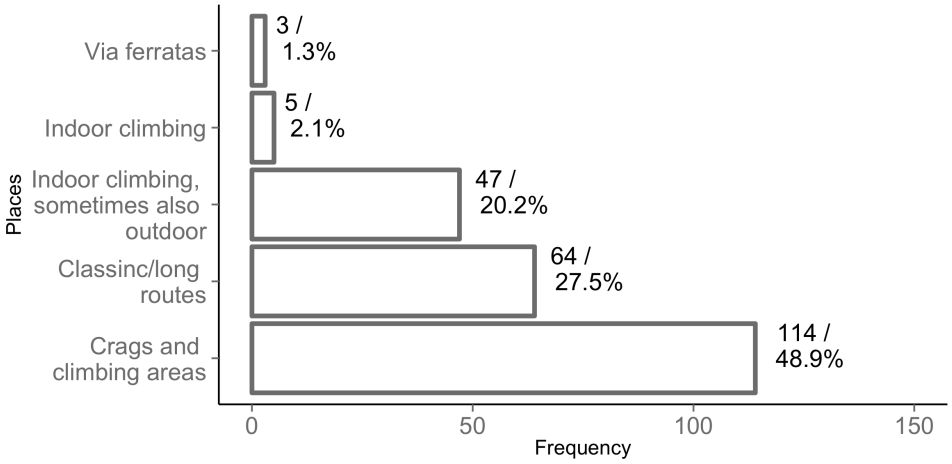


Figure 17: Places where climbers practice their sport

gathered during focus groups, the majority of climbers prefer to use books with reviews performed by professionals and well-know authors as their main source of information (Figure 18).

In addition, the survey confirmed the importance of historical weather data regarding the days before a scheduled climbing with a 95% of interviewed that agreed on this point. As far as traffic is concerned, the survey suggests a less drastic approach compared to one described in focus groups. In general, the questioned reported that traffic is a problem, although it is not perceived so powerful to force people to return home. In fact, it is still quite rare and in case of traffic climbers go to another route or wait and change their attitude. Only beginners feel it as such an influential problem, because easy routes often suffer from traffic and due to the limited number of grades they can perform, beginners will encounter issues in finding another route that suits their level. Thus, beginners should often change climbing area and as result they try to guess the best time for visiting crags, meaning the time which is best known for low or moderate traffic.

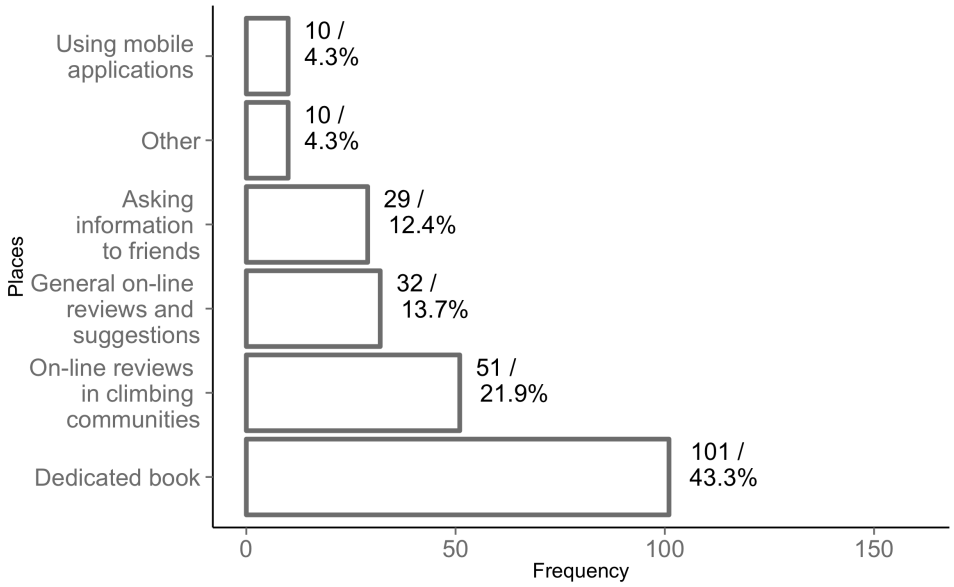


Figure 18: Climbers' sources of information

In general, the obtained results that the survey confirmed and the additional suggestions it provides can be sum up as follows:

- Climbers are mainly men aged between 24 and 35 (This finding could be influenced by the fact that the survey was published on online forums).
- Climbers are not only interested in weather forecasts, they are also strongly interested in past and real-time high-resolution weather information.
- Traffic is a slowly increasing problem, especially in crags and climbing areas. People tend to avoid traffic, but when they encounter it they move to another place or they change their approach, considering security related issues.
- Route maintenance is an interesting prize for contests. Even though climbers prefer to stay alone while climbing, the sport is characterized by a strong social aspect. People desire the best for their sport rather than for themselves.
- Climbers are still using books dedicated to their sport as the main source of information.

### 3.2.6 The Customer Journey Map

Customer journey maps aim at identifying touch points between services and users. In this case, I have used these tools in order to map activities performed by users while organizing an outdoor climbing session. At this stage, the term customer has been used improperly, as there is no proper customer, but there are only people taking action in order to practice their favourite sport. In fact, they are not using

a single service or a single service provider, they are using several services from different providers. I was interested in how many services they use and when do they use these services.
I decided to map the performed actions in order to design a possible new service that fits the currently adopted procedure. In general the identification of a single journey is a difficult task, each interviewed reported some difference in their usual habits.

The following list tries to visualize a general chronological order between the identified activities:

1. **Establish a date for climbing**
   Each climber starts choosing a suitable date.

2. **Check weather forecasts for the chosen date**
   Weather is one of the most important aspects. People prefer to avoid climbing while raining.

3. **Contact friends**
   Climbers require the presence of at least another person.

4. **Suggest the place**
   This activity can be performed also before the previous one, it does not really matter: sometimes climbers first contact friends while sometimes they first identify a place they like and only after it they contact their friends.

5. **Check the equipment**
   Groups of friends check their equipment, making sure that all necessary instruments are available and eventually they rent the missed ones from other friends.

6. **Establish suitable grade for climbing routes**
   All participants should be able to practice their favourite sport.

7. **Re-check place for chosen grade**
   Occasionally, climbing areas do not have the characteristics that the teams are looking for, thus there is a need for changing the chosen place.

8. **Recheck date and time**
   Some places are well known for traffic at certain times. For example, beginners reported that they know it is better to avoid areas with few tracks for beginners between 17:00 and 18:00.

9. **Go and climb**

Figure 19 summarizes the order in which tasks are performed.

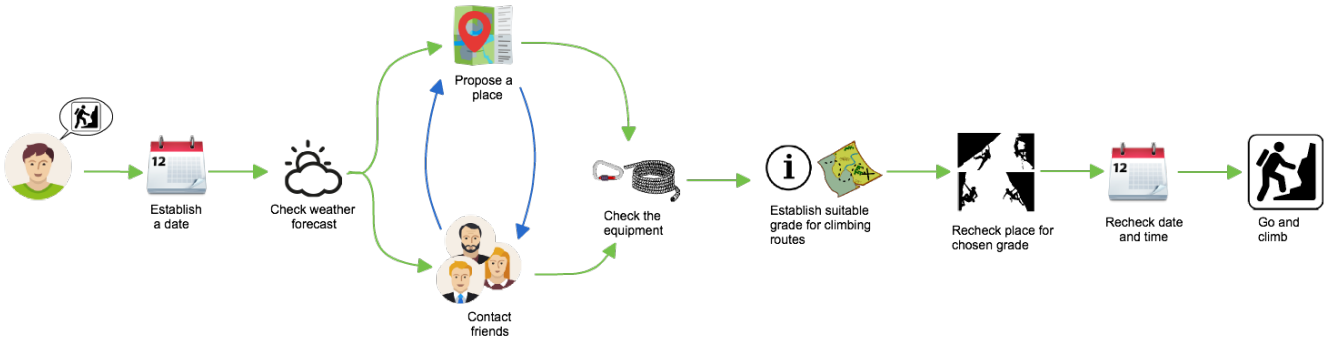


Figure 19: Typical customer journey of climbers

### 3.2.7 Design of a suitable solution

After completing all the previously described service design steps, I moved on the design step. In particular, I was interested in a solution for climbers to target the problems of:

- Finding good quality information on crags and itineraries
- Traffic information
- Weather information

Also an additional non-central section for contests participation was designed in order to mix needs of consumers with the initial requirements and idea proposed by the client.
It is important to specify that due to the results obtained in the survey the service scope was reduced only on crags and itineraries, meaning a path that includes either several crags or the path to reach the crags and to return back to the parking area.

In particular, the previously identified problem could be addressed with the following strategies:

**Weather information** can be easily retrieved from official weather providers that adopt open data policies. Several different companies provide forecasts, while historical data need some more research. In the Trentino area both information are easily accessible from *MeteoTrentino*, a local provider.

**Information source and quality** Information will be provided by other users, initially a group of paid experts would review the most famous crags. Afterwards, users should be able to trace their paths and share them with others inserting detailed descriptions. The quality of information would be guaranteed by a rating system for both the reviews and the reviewers. In particular, the rate of the users could be computed as the average rate of their reviews: by using this approach users will always be interested in improving them. Moreover, moderators will monitor reviews in order to remove them or obfuscate inappropriate content.

**Traffic** could be monitored using a crowdsourcing approach similar to the one adopted by the mobile navigation application *Waze*. The first person that encounters traffic could signal it on the map, so that other users could see it. Standard validity of traffic information has been identified in one hour, but users should be allowed to eventually change it.
Traffic information could be also retrieved analysing how many users expressed their desire to practice in a particular place at a particular time and analysing the GPS positions of the users that are using the application in a specific moment. Furthermore, the analysis of historical traffic information could also provide useful data.

### 3.2.8 Mockups and usability test

Wireframes and mockups were used in order to test a suitable application and its design with five potential users. This stage has been started creating paper-based sketches, moving to wireframes, low-resolution mockups, prototypes and finally developing a high-resolution prototype. Unfortunately it is not possible to include all the produced designs. As a result, this section describes only few mockups that were used in a stage between low-resolution mockups and the final high-resolution prototype. The final result will be described in the next chapter.

The application is formed by 4 main interfaces:


Figure 20: Home

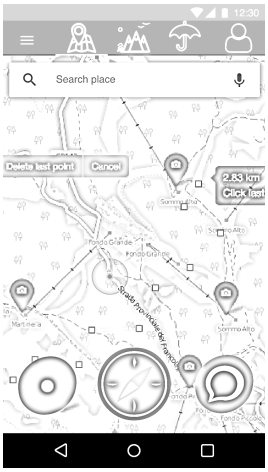


Figure 21: Map

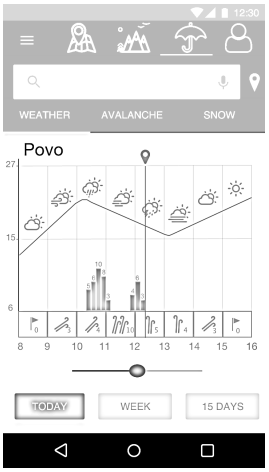


Figure 22: Weather

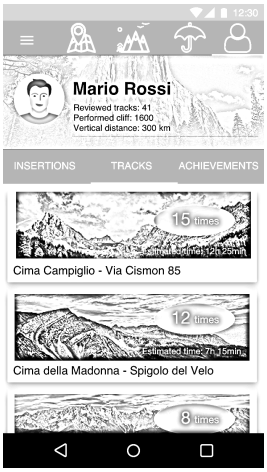


Figure 23: Profile

The first interface that users will encounter was identified in the interface that provides the list of available crags and itineraries (Figure 20). The customer journey map identified weather as one of the first aspects that climbers check. However, using the weather section (figure 22) as the first interface, would transmit the idea of an application oriented to weather information rather than climbing.

In the home interface (Figure 20) users could search for places they like, filtering the list according to the expected walking distance, difficulty and average user's rate.

This lists only includes crags and itineraries and by selecting a particular itinerary or crag users could access to detailed information (Figure 24). The application rely on a crowdsourcing mechanism to obtain this data.

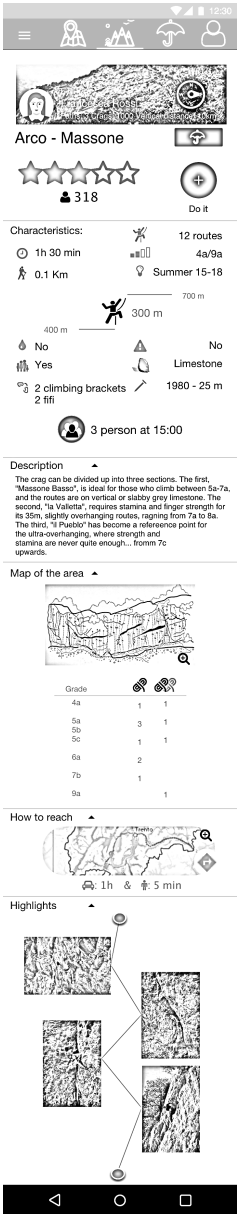


Figure 24: Details

Provided information includes:

- Exposition
- Information about the reviewer
- Rate
- Number of climbing routes
- Expected travel time
- Difficulty level
- Walking distance
- Suggested season and time
- Vertical difference
- Possibility of climbing when raining
- Dangers
- Place suitable for families
- Type of rock
- Suggested special equipment
- Year of last maintenance
- Number of expected people
- Description of the place
- Map of the area
- Details about available routes
- Navigation - How to reach the place
- Highlights on the climbing wall

In this section users could also mark the analysed crag as one they will try, specifying the date and time in which they plan to perform it.

In the map section (Figure 25), users could navigate information concerning a climbing area using the map, equipment stores and webcams are also included. Moreover, users can track their GPS position (Figure 26).

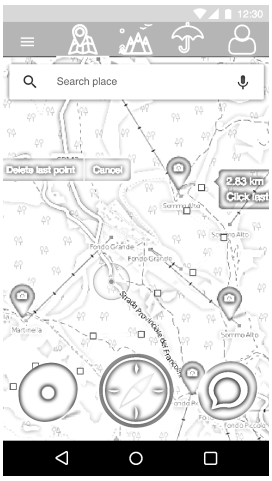


Figure 25: Map

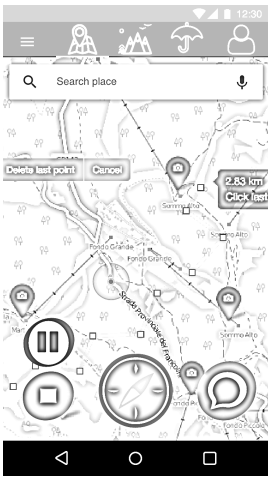


Figure 26: Tracking tool

Furthermore, users could find some useful tools at their disposal (Figure 27). Using these tools, they can capture and insert photos, signal map errors, signal traffic (Figure 28), advertise a climbing related event to other users and insert a new climbing review.

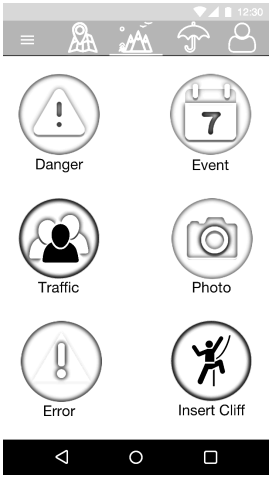


Figure 27: Tools


Figure 28: Traffic

In the weather section (Figure 29), users could find information about weather in terms of both previous weather and forecasts. Moreover, two additional sections provide information about snow. Avalanche bulletins (Figure 30) and altitude at which first snow is present (Figure 31) were initially considered as useful information for climbers, in particular for climbers that enjoy ice waterfalls. However, further investigation proved that the population of ice waterfall climbers is excessively narrow and thus not significant.

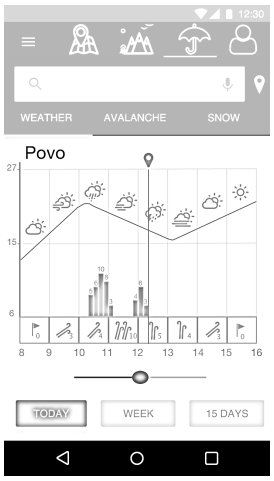


Figure 29: Weather

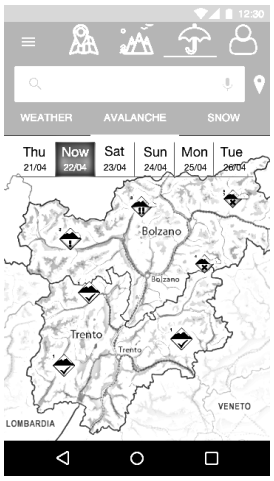


Figure 30: Avalanche

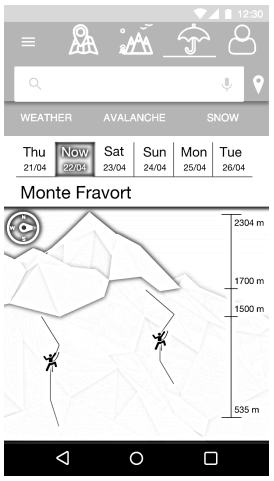


Figure 31: Snow altitude

In the profile sections, users could analyse tracks they have previously performed (Figure 33) and crags they have reviewed (Figure 32). Furthermore, users could also analyse their statistics and achievements checking the badges they obtained (Figure 34).

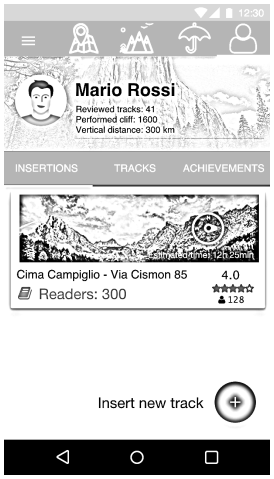


Figure 32: Reviews

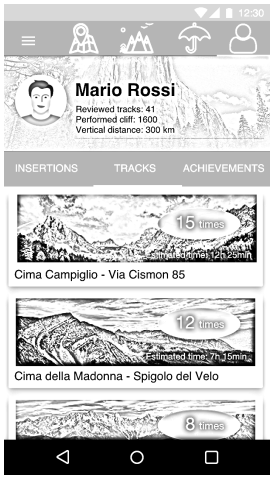


Figure 33: Tracks

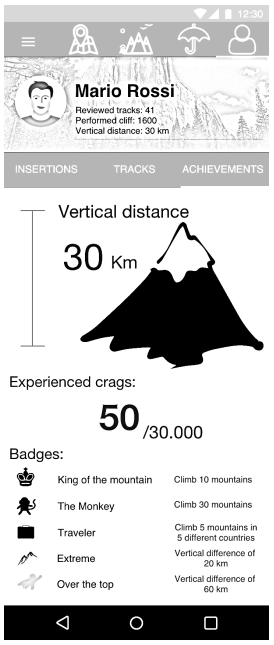


Figure 34: Achievements

Finally, by opening the navigation tool bar (Figure 35) users could access other non-key features.
This tool bar includes contests, settings and access to shop locator and online shop. Selecting contests users could visualize the list of available ones (Figure 37), their details and participation instructions (Figure 38),

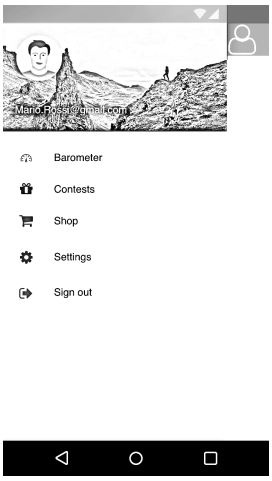


Figure 35: Menu

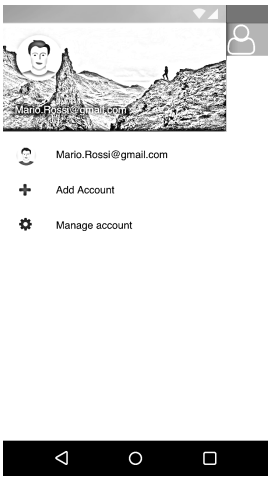


Figure 36: Manage account

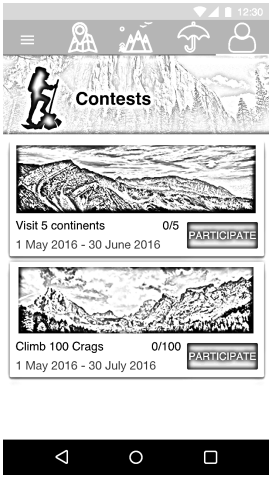


Figure 37: Contests


Figure 38: Details about single contest

Moreover, the navigation tool bar also includes a link to a useful barometer (Figure 39). During focus groups, participants reported that weather is so important that sometimes they prefer to have a personal barometer. Surprisingly, new smartphones include a barometer sensor, thus considering how easily this functionality can be implemented I decided to develop it as a study case in order to investigate how many users would really use it.

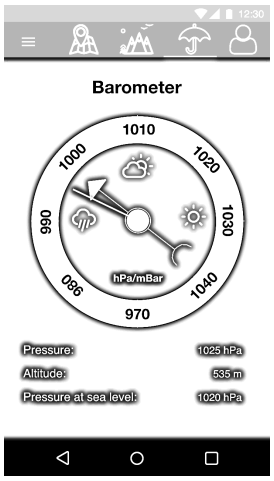


Figure 39: Barometer

The described mockups were also used to develop an iterative prototype available at this link `https://invis.io/MN76U1N5E`.
Usability tests performed on this prototype evidence difficulties in understanding the provided information about itineraries and crags. Criticalities were evident in limits that characterize the used icons. Moreover, the testers had difficulties in understanding the difference between itineraries and crags.
Additional doubts that the users had concerned information sources and revealed that they were worried about the possibility that different users could review the same crag or the same climbing route, producing useless duplicates. The questioned also reported that they would like to review single routes, as they will never know all the information regarding the entire crag and climbing area. At the moment, this will result in the fact that they would avoid to add information about the crag.
In order to overcome these issues, the solution was modified in order to target only crags and climbing areas. Users will be allowed to insert information using an approach similar to *Wikipedia*: for each climbing area and for each climbing route only one description will be allowed. Users will contribute to the available description improving the content and moderators will ensure the presence of a single cumulative review.

# 4 Research Findings

This chapter summarizes results obtained using service design tools. Moreover, the final evaluated prototype is here introduced.

## 4.1 Summary of the obtained results

The adoption of service design tools completely shifted the initial focus that characterized the development of a mobile application for sport practitioners. Initially, a customer proposed an application that could target four different sports: alpine trekking alpine speed, alpine mountaineering and ski mountaineering.
The performed study highlights a better possibility for a software solution that target only climbing. Market analysis evidences the presence of several and well knows competitors that already provide multi-sport targeting applications, while only few competitors target climbing. Moreover, all of them adopted a different approach when measured against the one proposed in this thesis.
Furthermore, market research reveals strong possibilities in the local area (Trentino-Alto Adige). Trentino is considered one of the reference areas for climbing, crags are everywhere and the local economy is strongly based on tourism. As a result, administrators are certainly interested in further promoting tourism taking advantage of already available sport infrastructures. An additional investigation on social implications that characterize a solution that motivates people practising sport highlights also a strong interest by *Horizon2020*, the European foundation for future challenges. In particular, by the *Health2020* program which is part of it and address heal related issues promoting correct lifestyles. Therefore, the application could be already promoted on different geographical levels, starting with Trentino, Italy and Europe.
In general, the obtained prototype can be contextualized in the recent trend of producing solutions for local areas and then eventually scaling up, addressing needs of greater regions.

Summarizing the obtained design, this thesis elaborates a mobile application that targets the following issues for climbers:

**Retrieve high-quality information** Users will be involved promoting a crowdsourcing approach inspired to the one adopted by *Wikipedia*, single reviews will be present for each climbing area and crag. Users could contribute inserting missed reviews or improving available ones. Reviewers will be rated according to the average grade of the reviews they have contributed. Initially, all users will be allowed to edit every review, availability of modification history enable moderators to restore previous versions in case users compromise the quality of the previously inserted data. However, in future only users with a rate that is higher than the one of the review they want to contribute in would be allowed to edit the content. While, the possibility of inserting new data will remain available for everyone.

**Traffic** Information will be collected using two different channels. On one hand, users could signal the presence of traffic to all other climbers, an approach similar to the one used by the famous navigation and traffic based application *Waze*. *Waze* demonstrated the potential of its approach up to the point that in 2013 *Google* acquired the company. On the other hand, the platform will be capable of predicting the presence of people in certain place using different approaches: analysing scheduled tracks that users declared they want to perform, extrapolating GPS positions of users that opened the application in a established time slot and taking advantage of machine learning algorithms to infer traffic information trough patter recognition.

**Weather** Information will be provided using three different types of data: First, historical weather information will be collected from weather stations available in the local area. Second, short time forecasts will be retrieved from local weather providers, for example in the Province of Trento *Meteo Trentino* provides a useful service named *Meteo Radar*. Third, weather forecasts will be collected from available forecasts services. Reliable providers have been identified in openweathermap.org and yr.no.

Moreover, as initially requested by the client the designed application also includes a shop area and a contest section. This way the company can try to engage potential consumers with their products following the approach they initially suggested.

## 4.2 High-resolution mockups

High-resolution mockups are also available in iterative format at this link `https://invis.io/K47FFSASW`.
Reported mockups do not represent the entire application, instead only commons and keys interfaces have been developed.

Figure 40: Launcher icon

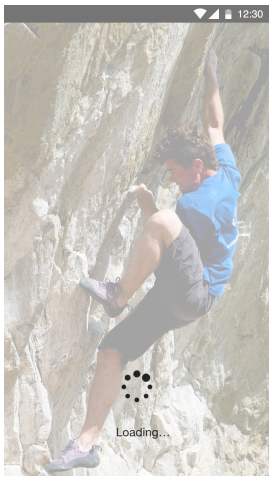


Figure 41: Splash screen

The launcher icon (figure 40) and the initial splash screen (figure 41) provide an idea of the sport that this application targets.

The application requires people to login (Figure 42) or sing up (Figure 43) in order to retrieve their personal data and allow them to edit available contents.

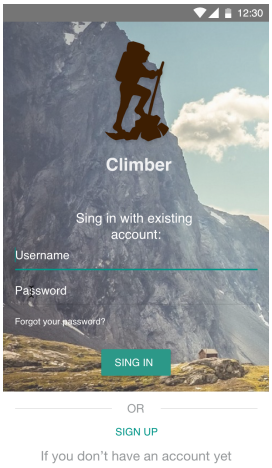


Figure 42: Sign in

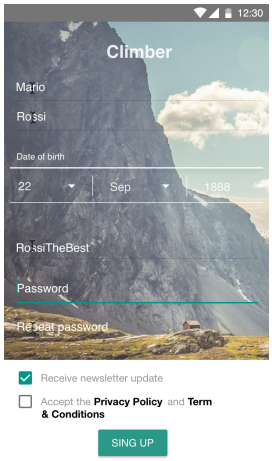


Figure 43: Sign up

The first page users encounter once logged in contains the list of available crags and climbing areas with an useful search box (Figure 44). Crags can be filtered according to their rate, the time required to approach them and their difficulty grade. For each crag some detail are provided including the presence of traffic.
Selecting a crag, users could access to a detailed description (figure 45), information available in this area regards general aspects of the climbing area. Clicking the "show routes" button users could analyse all available routes in the area (Figure 46). Finally, selecting a single route users could access to details of the chosen route (Figure 47), general details about the crag are reported in this interface too, in this way consumers would not need to return back to visualize general information about the place they are interested into.

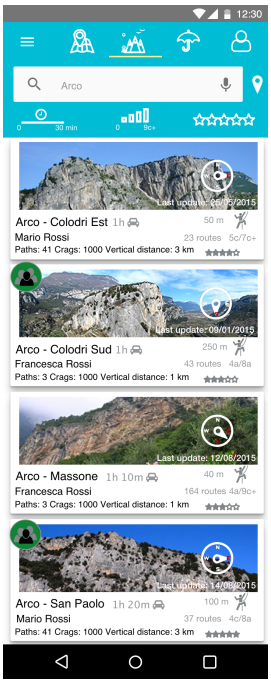


Figure 44: Home

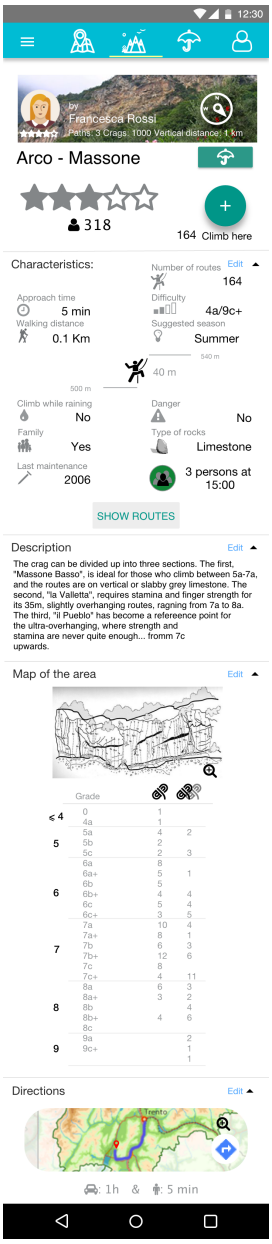


Figure 45: Crag details

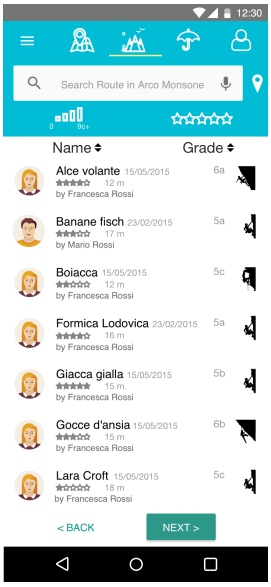


Figure 46: Routes

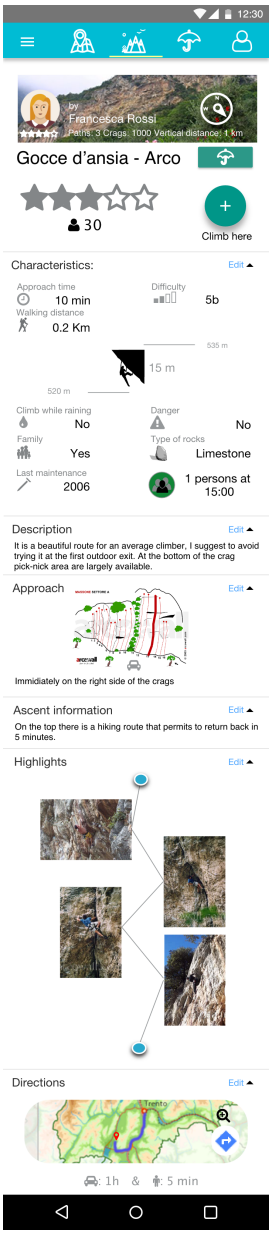


Figure 47: Route details

Using the navigation tool bar or using the included navigation service users could access to the map section (Figure 48). The map section includes tracking tools (Figure 49) and an useful compass that could be pressed in order to centre the map on the consumer's location.
Tracking tools are implemented aiming at two different results. On one hand, they allow users to record the path they performed in order to reach the crags. On the other hand, tracking tools are necessary instruments for the application, the server could certificate that users really performed specific crags and could elaborate statistics/achievements only for users that traced their activities.

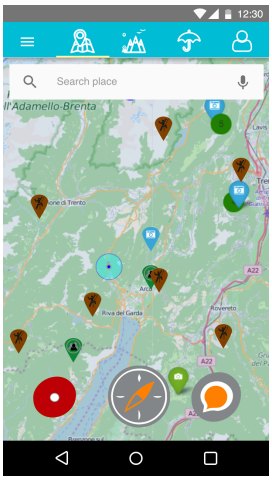


Figure 48: Map

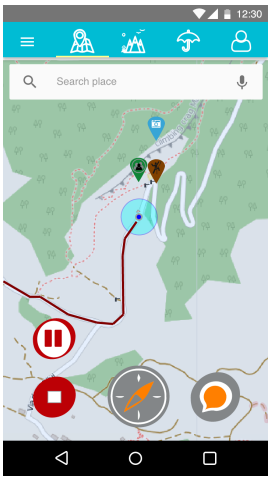


Figure 49: Tracking tools

Furthermore, the map contains placemarks for photos, crags and other info such as traffic and firm's stores. Selecting a specific placemark climbers could visualize further details. (Figure 50 and Figure 51).

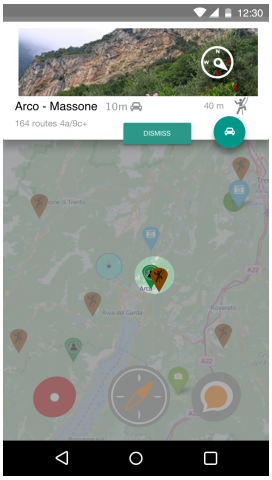


Figure 50: Crag details

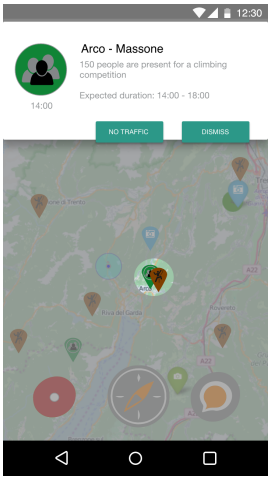


Figure 51: Traffic details

Users could also insert new placemarks using the actions interface (Figure 52), for example in order to insert new traffic information (Figure 53).

In the weather section (Figure 54) consumers could visualize detailed information about places they are interested in. This section could be reached from the navigation tool bar and from the two interfaces that present detailed descriptions about crags and routes. In particular, when users reach this interface starting from description interfaces the place of interest will be automatically filled in.
Weather information includes, precipitation, air temperature, wind direction, wind speed and general weather situation. A red line separates data measured by weather station from expected forecasts.

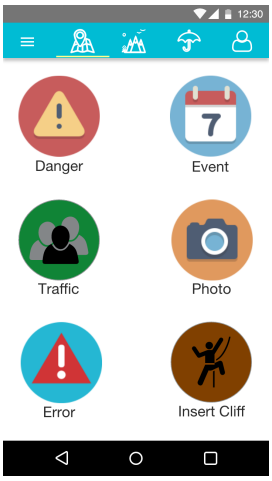


Figure 52: Map actions

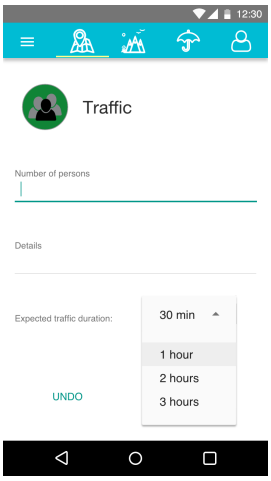


Figure 53: Signal traffic

Moreover, users could also consult a short time forecasts on a high-resolution weather radar (figure 55).

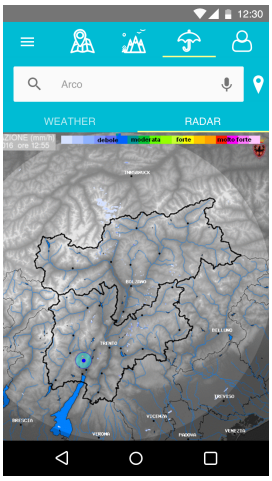


Figure 54: Weather

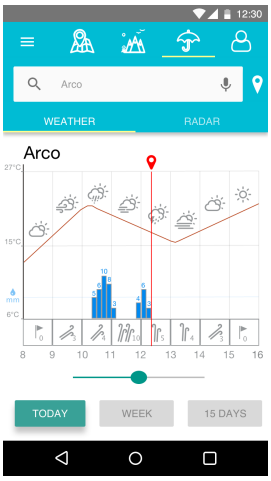


Figure 55: Weather radar

The application also includes a personal area. In this area users could check the status of the reviews they have contributed in (Figure 56). Besides, they could check places they visited (Figure 57), visualizing details and recorded traces (Figure 58) and listing their personal statistics/achievements (Figure 59).

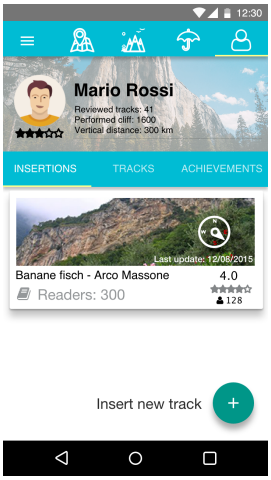


Figure 56: Personal insertions

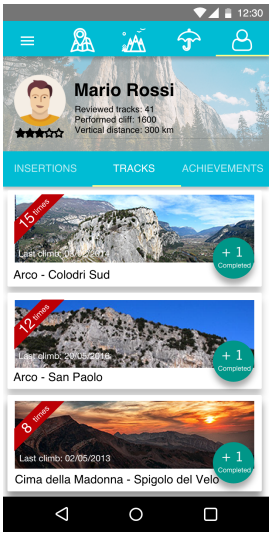


Figure 57: Visited places

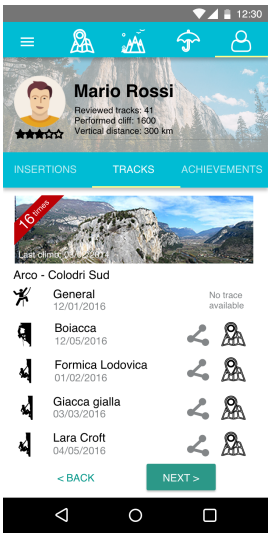


Figure 58: Recorded traces

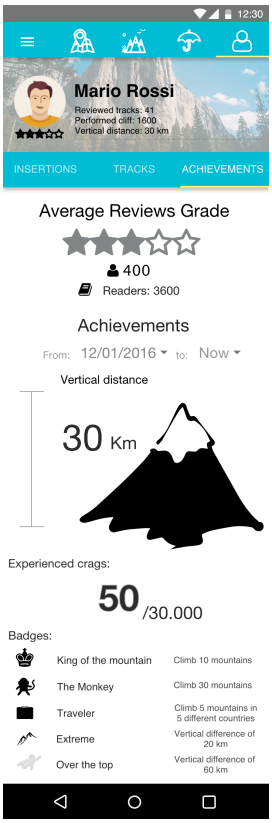


Figure 59: Personal achievements

Finally, a side menu (Figure 60) facilitates users to access further sections of the application and to manage account information (Figure 61) and settings.

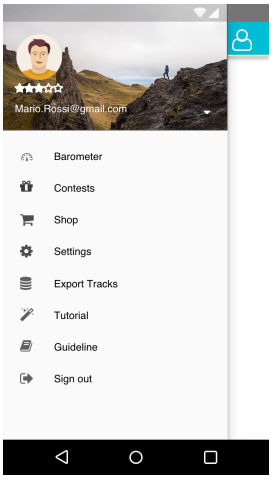


Figure 60: Menu

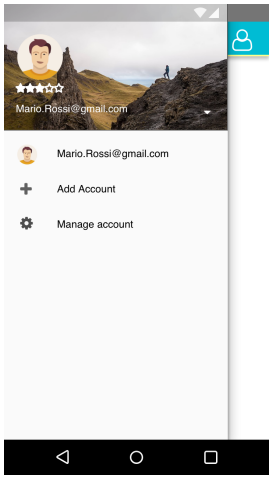


Figure 61: Manage account

Using the side menu or visualizing notifications (Figure 62) users could access to a contest area.

In this area the client can advertise contests and try to engage consumers, this area has been not inserted in the main sections because it has been considered as an experimental additional feature.

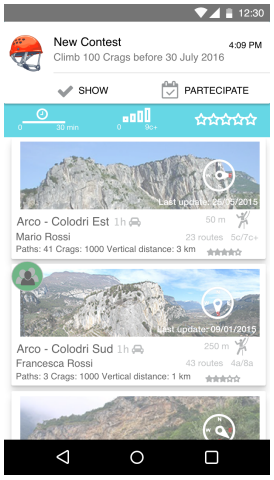


Figure 62: Notification

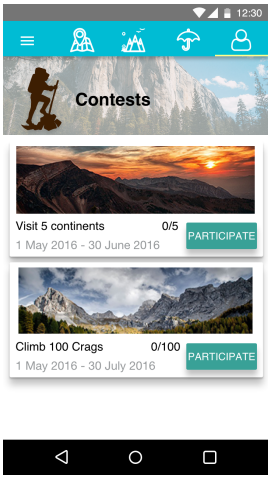


Figure 63: Available contests

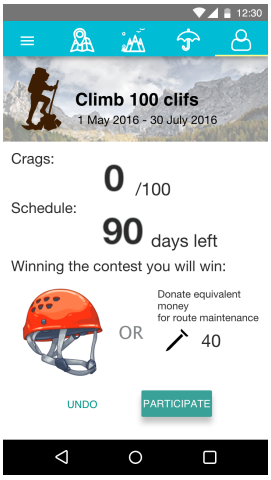


Figure 64: Details about the contest

Similarly to the context section, a barometer has been inserted in the side menu as a pilot feature. This experimental feature tries to address the needs of expert climbers that rely on barometers in order to predict bad weather.

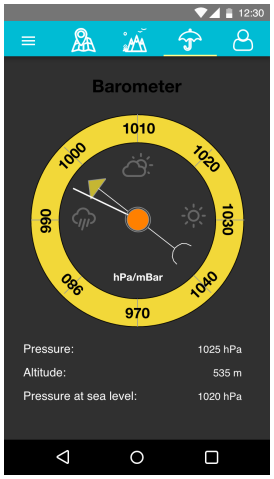


Figure 65: Barometer

# 5 Discussion

In this chapter, answers to the research questions are provided and discussed. Research questions were the key drivers of the study and here they are analysed by drawing learning and main conclusions. Where applicable, answers are motivated using reviewed literature and including clear examples.

## 5.1 First research question

**RQ 1** Can a market decision be motivated using a posteriori user research in markets where most common needs are apparently already addressed?

Answer to this question represents the key requirement of this study. After the first few co-creation meetings with the client, it was already clear that several similar mobile applications are already targeting the outdoor sport market.

Available applications can be divided in two categories:

**Application that targets sport training** These applications focuses on preliminary training activities performed in order to prepare for the real sport performance or to conduct a scheduled healthy lifestyle. They often include training videos and calendars to organize and monitor personal training schedule.

**Application that targets sport practice** These applications target the sport practice; they are often oriented to performance or calories burn. The main characteristic of these applications is the presence of tracking tools and statistics about personal performances. There are some slight differences between them due to the presence of additional features, such as social integration, possibility to design personal tracks and weather information. In general, the only strong difference that could attract users to prefer one solution over the other is the possibility of following itineraries inserted by others and the amount of available itineraries and data in general.

During this study several strategies have been identified and analysed in order to enter in such competitive market.
First possibility was to simply use the same features other applications have and improve user interface design and general navigation.
Second possibility was to consider an already available solution and improve it by adding other features: in particular, gamification was the one identified by the client.
Final possibility was to find a small customer segment that current applications are not targeting. Available applications adopt general approaches thus they could not address all needs a small customer segment has.

In my opinion the third approach offers the best opportunities, while first and second approaches could also succeed but the problem we identified talking with

people is that they have already recorded some data with existing platforms, thus migrating or losing them constitutes a strong barrier.
During this study we understood that people do not recognize a design improvement as something that can motivate them to migrate to another application, especially when the migration implies the lost of virtual friends and data. The same is true for an application that includes additional small features, the fact that friends will remain on the previously adopted platform is a strong entry barrier. In order to support this thesis we can consider for example the challenges that the famous messaging platform *Telegram* has faced while trying to attract users form the other and more famous platform *Whatsapp*. *Telegram* has always based its promotion on two additional features: security through encrypted messages and free availability of the application. However, most of the users of *Whatsapp* preferred to pay and continue using less secure messages rather than being unable to message with their friends. The single moment when *Telegram* attracted a huge number of users was during a four hours server fault in *Whatsapp*. Nowadays, *Telegram* is certainly well know but it has to struggle with the fact that the competitors have also implemented message encryption and has started to offer its services for free. As a result, the two principal advantages have disappeared and users do now only concern about who manage their data.
In addition the third approach has two main advantages: on one hand, it forces the client to start a service design process; in fact, starting without any idea about the customer segment they would target permits to analyse different possibilities. Without any idea managers could not directly influence service design suggesting their own application. On the other hand, if the company succeeds in identifying real problem people have then the application will certainly succeed.

To sum up, the answer to the question is yes even in crowded markets companies can figure out a strategy to compete with players that are already present.
Several strategies have been analysed, all of them require a well performed user research in order to guarantee a future success. However, the best strategy I have identified and adopted during this thesis is to create a specialized solution that targets a underserved customer segment. The experience I gathered during this thesis demonstrates that even in market were most common needs are apparently already addressed it is possible to identify a group of consumers that have additional really specific common needs. The task companies have to address is to find the customer segment that best suits their brand and that is big enough to guarantee a healthy business.

## 5.2 Second research question

**RQ 2** How to use Service Design methods and market research to uncover underserved needs in crowded markets?

Available literature reports description of several service design tools. Tassi [2008] and Stickdorn and Schneider [2012] are two valid sources of information about service

design tools. Moreover, Pichlis et al. [2014] provides a good review of 14 design tools using them in the context of mobile application design.

All service design tools can be used to discover underserved needs. However, a standard order that could be used to apply service design tools is still missed. The framework developed by Stickdorn and Schneider [2012] to describe service process clearly emphasizes the fact that service design is an iterative approach, which cannot simply be described as a sequential execution of tasks. Moreover, service design tools can be employed in different ways: the same tool can be used with a different goal, thus obtaining different results.

As previously stated, this thesis has adopted the framework developed by Stickdorn and Schneider [2012] and using this framework visualizing when service design tools have been used and what goal they were looking for is quite challenging.
Following Pichlis et al. [2014] intuition, Figure 66 reports the used service design tools in an adaptation of the Innovation Model by Kumar [2012].

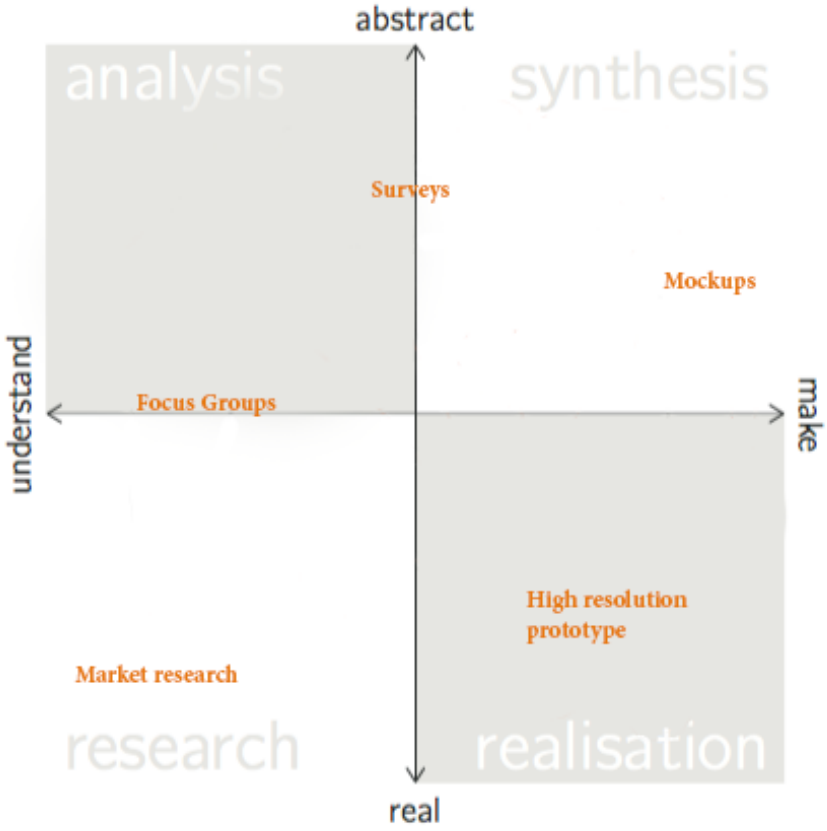


Figure 66: Adopted design process represented on the innovation model - adaptation from Kumar [2012] and Pichlis et al. [2014]

This thesis clearly used only few tools due to time limitation, while Pichlis et al. [2014] performed a better analysis using 14. Nevertheless, the tools cover all the 4

phases of the Innovation Model.
As previously stated, establishing an order in which service design tools should be applied is a difficult task. Moreover, similarly to the problem of defining service design, limiting the approach to a merely application of pre-established tools will limit its potential. As a result, the learning lesson that this thesis teaches is not an execution order for service tools. Instead, it is the need of applying at least one tool for every stage of the Innovation model.
One tool that has been identified has essential and that has been used multiple times for the same reason is market research. In multiple occasions, these tools allowed *Motorialab* and me to look for possible additional investors and to understand what competitors were doing at the same time.

## 5.3 Third research question

**RQ 3** Does the complexity of an application design change when addressing engagement rather than only user needs? What are the possible strategies that allows to mix the two approaches?

The complexity of an application definitely changes when targeting consumer engagements.
Adopted services design tools demonstrated that people perceive engagement in different ways. This study clearly identified two different types of customer engagement approaches:

- First is customer engagement with the brand.
- Second is customer engagement with a particular service.

Originally, the client was trying to engage its customers with the brand. In fact, the sport equipment manufacturer obviously aims to sell more products in the long-term period.
The initial idea was to use a gamification approach offering rewards for the completion of small challenges. However, in this thesis this approach appears as excessively complex. Identification of challenges that everyone can complete and of prizes that everyone will enjoy is not a trivial task. For example, expert climbers reported that they are more interested in receiving maintenance contributions for their favourite crags, while beginners reported that they would enjoy equipment-based prizes.

Customer engagement is a psychological state characterized by motivational drivers [Van Doorn et al., 2010]; it needs to be addressed by taking advantage of expert's experience when addressed through gamification. In fact, gamification approaches should be consistent with the brand recognitions firms have built in previous years. Thus, it requires the involvement of both psychologists and marketing experts. As a result, from a service design perspective engagements with a company appears

more as a side effect of the development of a good solution rather than a characteristic that designers could target.
Moreover, engagement has been considered as a risky approach in an application that tries to obtain it using gamification and rewards as its key features when compared to already available solutions. Confirmation of the high risk a solution only based on gamification represents can be found in Gartner [2012] that declared that 85% of services based on gamification will fail due to poor design. The situation appears completely different when all users have a direct benefit from their engagement with a service or a product. This thesis proposes a solution based on information crowdsourcing, where gamification is used only as an additional completely separate feature and not as a key one.

Participation in crowdsourcing platforms represents an engagement status with the service. People are strongly invited to contribute to the platform, as they will receive information that is also useful for them. Thus, crowdsourcing is a good strategy that permits to mix utility and engagement. In particular, successful applications of crowdsourcing has been identified in *Wikipedia* and *Waze*. Inspired by these two successful stories this thesis proposes to target customer engagement by developing a mobile application that mixes the services provided by the two mentioned platforms in the context of climbing.

## 5.4 Validity of the research findings

This study focuses on proving that it is always possible to enter in market even when the market is already crowded (RQ1). Using this as a base foundation, the study focuses on the application of different service design tools (RQ2) in order to identify a small customer segment, a problem people in this segment have and trying also to design a solution. Finally, this study analyses a characteristic of the final solution that in initial design was considered an essential killer feature (RQ3). Validity of the obtained results is here discussed in terms of their limitations.

**Environmental limitations** This study has been conducted mainly involving people that live in the Trentino area. The only tool in which I was able to involve people from other areas was survey. In particular, links to the survey were published on Italian and International forums dedicated to mountains activities. This helped engaging external people but introduced another limitation. People that use web forums are certainly familiar with technologies and they do not limit their information sources only to books. However, this last aspect could be considered as both a limitation and an additional value.

**Number of participants in design activity** The number of participants in each design activity was limited. Excluding surveys, which involved 233 persons, all the results obtained by other tools have been considered valid when at least 5 participants completed the assigned tasks. Involving persons is a really time

consuming activity that is complicated by the fact that people are normally busy during weekdays, as a result they will rarely contribute in unpaid studies especially when they are required to actively participate in meetings.

**Number of people working on this study** From my personal perspective, I was the single person working on this branch study of the mobile application. I have obtained support and help, but I was the only person in charge. I did my best to keep an objective perspective. However, it is still possible that the study reflects my own understanding of the problem and of the obtained findings.

# 6 Conclusions

## 6.1 Overall results

Following market strategies adopted by big companies, medium and small brands are currently shifting their approaches from typical product based strategies to strategies based on both products and services.
An effective approach small company are currently adopting, especially startups, is to develop solutions that target social and ethical values in order to attract investors and founds. This thesis highlight an opportunity in global trends related to health. The Wellness industry has recently attracted strong interest due to its influence in people lifestyles and health.
In last few years, health-care systems have shifted from diseases and sickness to prevention strategies. One of the biggest problems several organizations and countries are targeting is ageing population. Market analysts have already reported that the over 65 population is expected to double before 2050 and that the related healthcare costs would profoundly affect public finance and healthcare system [Poor's, 2010, 2013]. Several companies are addressing this challenge by promoting outdoor activities and sports trying to keep people active, thus reducing the number of diseases caused by insufficient physical activity.

This thesis presents an empirical study of market entry into mobile application market for outdoor mountain sports. A local sport equipment and clothes manufacturer (client) is trying to engage its customers in outdoor sports by creating a mobile application. Several service design tools have been used to refine the initial idea, including co-creation meetings, marketing researches, focus groups, survey and customer journey maps.

Initial description of the application presented a general multi-sport targeting solution. The sport equipment manufacturer was trying to engage as many persons as possible in four different mountain sports: alpine trekking alpine speed, alpine mountaineering and ski mountaineering offering a solution mainly characterized by tracking tools, rewarded challenges and weather information. This application would represent the first step the client is taking in the direction of IoT. Although IoT features will not be immediately included, in the future all products produced by the sport manufacturer will implement some sort of IoT functionalities that would connect with the produced application.
Market research highlights the presence of many successful competitors in this market and the need for a solution that could strongly motivate people shifting to the new platform overcoming the problem of losing their data when leaving already available similar solutions.
The uses of the different design tools highlight a better opportunity in the really specific customer segments of mountains climbers. Following these findings, this thesis presents an application that addresses three independent problems:

**Weather information** including historical data, weather forecasts and high resolu-

tion short-time forecasts. Most applications that include weather information provide only forecasts, while climbers are interested also in previous weather in order to avoid wet crags.
Moreover, climbers are interested in very specific information such as solar exposition. For instance south-facing crags can be performed also during spring and late autumn as they are characterized by a short drying time and a warmer air temperature.

**Crags information crowdsourcing** Climbing is a sport that is still strongly linked with information mainly available in book formats. Prices of dedicated books have been identified as an entry barrier. Online resources are often avoided due to personal or dated descriptions and due to low credibility of information. Websites with good credibility often misses contents or are characterized by the absence of a standardized presentation formats.

**Traffic information** Traffic has been reported as a problem for climbers especially for beginners. Waiting is always boring and the presence of other climbers on the same crags implies potential safety issues.

Results of this thesis are a validated high-resolution prototype that could be used to proceed in application development and a service design case that could be used as a reference for future projects.
It is important to note that addressing a smaller segment does not limit future plan in the direction of IoT: similarly to what happened in this study, the application of smart device to future products could follow a more specialized approach instead of a general one.

## 6.2 Future improvements

This thesis highlights a good opportunity in developing an application that targets mountain climbers. First problem to address is to convince the client of the validity of the solution. Client started with a completely different idea and will certainly try to protect it. The change of focus could be considered excessively drastic, and for this reason I suggest to investigate how to mix some of the features identified in this thesis with the original ones. For example, further investigations could deeply analyse traffic related-problems and information crowdsourcing in other sports.
The strategy I suggest to completely avoid is to add all the identified features and a climbing dedicated section in the original application. The original idea was already addressing too many sports. I strongly suggest the client to develop a solution focused on few sports and successively expand it, if needed.

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